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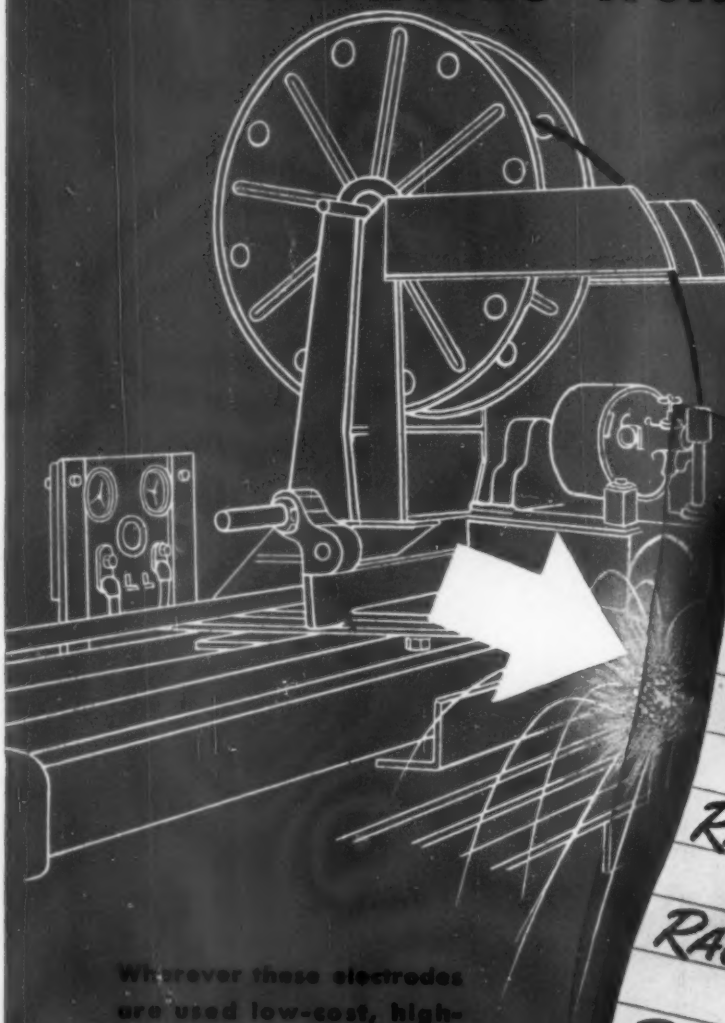

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Volume 31 • Number 10 **OCTOBER, 1946**

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Published monthly by
THE WELDING ENGINEER PUBLISHING CO.
A Division of
McGRAW-HILL PUBLISHING CO., INC.

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EDITORIAL AND PRODUCTION OFFICE:
520 N. Michigan Ave., Chicago 11
EXECUTIVE AND SALES OFFICES:
330 W. 42nd St., New York 18, N. Y.

The Welding Engineer Publishing Company. Publication Office, 110 E. York St., York, Pa. Entered as second-class matter at the post office at York, Pa., under the act of March 3, 1879. Subscription rates: single copy 35c. United States and Possessions: one year $3, two years $4, three years $5. Canada: one year $4, two years $6, three years $8.00. Pan American countries: one year $6, two years $10, three years $12. All other foreign countries: one year $15, two years $25, three years $30. Please indicate position and company connection on all subscription orders.

Address all correspondence regarding circulation matters to J. E. Blackburn, Jr., Vice-President for Circulation Operations. McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y.

A McGRAW-HILL PUBLICATION

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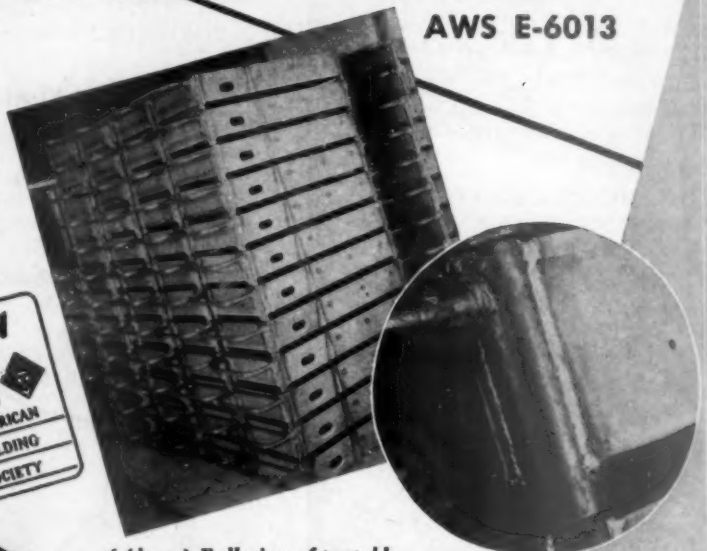

{Above} Full view of portable machine bases and close up view of corner weld made with **CHAMPION GRAYDAC** *Electrodes.*

{Above} Full view of bases for meat cutting machines and close up of corner weld made with **CHAMPION GRAYDAC** *Electrodes.*

APPLICATIONS

Auto Body Panels	Sheet Metal Work
Farm Equipment	Air Conditioning Equipment
Cans	Bus Bodies
Machine Parts	Fender Repairs

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Welding Propane Gas Tanks

BY FRED M. BURT

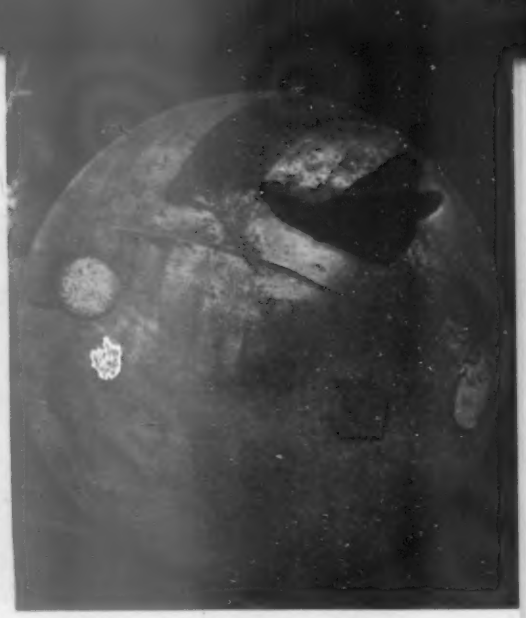


Fig. 1—Large split and tear in propane sphere caused by internal pressure resulting from an external fire when the truck upset. Note that the welds held perfectly

To make a perfect sphere from flat sections is something of a problem in geometry. It is also a problem in welding . . .

A TRUCK and trailer of propane-filled steel spheres upset and caught fire. The heat thus generated raised the internal vapor pressure of the gas too far above the original 250 psi. Fig. 1 shows what happened to one of the tanks. The inexorable expansion stretched the ½-in. steel plates thinner and thinner until the sphere burst like an overinflated balloon— but none of the welds showed damage.

These propane tanks were standard units manufactured by the Superior Tank and Construction Co., Los Angeles, which weld-fabricates a variety of unfired pressure vessels for air, liquefied petroleum gas and hot-water generators to ASME and API-ASME codes. Sixteen arc welders are used for this work, including two 600-amp automatic-welding units.

Test Requirements

Every inch of the welding on many of these pressure vessels is X-rayed to make certain there are no flaws. Many vessels are stress relieved to eliminate the strains set up in forming and welding the component segments of steel. When the working pressure on propane tanks is 250 psi, they are hydrostatically tested at 375 psi to conform to API-ASME code requirements (400 psi for the ASME code) and then hammer tested at 313 psi. The spheres have a safety factor of four, which means that they are constructed to have a minimum bursting pressure of 1,000 psi. Many of them have withstood 1,200 psi in test before showing signs of leakage. Thus it may be seen that the quality of welding on all Superior tanks must truly be superior.

The welded transportation and storage vessels produced range up to 10,000 gallons capacity. Many of the spherical and cylindrical tanks, particularly the larger ones, are made to customer specifications. The cylindrical tanks have hemispheres of the proper sizes welded to them to form the ends. For instance, 500, 1,000 and 1,500 gal cylindrical tanks use drawn hemispheres of the standard 150-gal, 41-in.-diam. propane ball. When the

Fig. 2—The plates for spherical segments are heated in the gas furnace at the left and then formed on the adjacent 600-ton hydraulic press. Some of the dished segments are shown in the left foreground

Fig. 3—Trimming edges of dished spherical segments to precision size. The flame-cutting machine is held by and revolves around a center pin. At left on truck are uncut segments with a template in the top one

Fig. 4—Outside welding on a six-segment sphere

Fig. 5—The drawn hemisphere of a 150-gal sphere is revolved by a positioner past a stationary cutting torch

single-piece drawn hemispheres are not the proper size for the ends of cylindrical tanks, spheres are welded up from six segments, and the resulting ball is flame-cut to form two hemispherical heads.

About three-fourths of the tanks produced are the popular 150-gal spheres, which are made by welding together two identical halves drawn on a huge 6,000-ton press in the plant of the Norris Stamping Co., Los Angeles. (This press is also used by Norris to stamp out bathtub bodies from one-piece, heavy-gauge steel.)

Six-Segment Spheres

Other standard-size Superior spheres have diameters of 32, 48 and 68 in. Each of these sizes is made up of six identical-sized segments, which are welded together after they have been dished. The segments are rough-cut with an oxy-acetylene cutting torch from flat $\frac{5}{16}$-in. steel plate. The cutting is done on steel tables, 72 in. long, 42 in. wide and 32 in. high. There are five tables in two rows at the end of the main building, and they are served by two overhead cranes that span the 40-ft width of the building and have a travel of about 220 ft. The two cranes are of three and five tons capacity and can be doubled up for heavy lifts. The steel plates are stored on edge in racks in a manner to make it easy for the crane-grab to pick them up for delivery to the cutting tables.

After the aforementioned segments have been rough cut to shape, they are trucked to the nearby heating furnace and 600-ton hydraulic press. The $6\frac{1}{2}$ by 10 ft direct-fired gas furnace brings the segments up to about 1,400 F in about five minutes. Two rows of rails in the furnace will hold two of the larger or four of the smaller segments. The heated units are transferred from the furnace to the press (Fig. 2) by a fork fastened to a crane. The plates are hot-pressed into "orange-peel" shape, using male and female dies for each size of segment.

Flame-Trimming to Size

Since the segments are rough cut to a little oversize, they must be flame-cut to exact form and dimensions. (See Fig. 3.) A steel template is set inside the formed segment, the exact placement being regulated by fitting at the four corners. The corners and the outline of the cut are marked in chalk; then the segment is placed in a holder on the edge of a special circular cutting table. The formed plate is positioned so that the first edge to be cut projects above the edge of the table top. It is held firmly in this position by a heavy set screw. The point of the set screw is placed in a small indentation, previously punched in the plate to insure centering.

Trimming is done with a flame-cutting machine that travels around the table on a radius arm to parallel the edge of the projecting plate segment. The segment is adjusted to an exact position by aligning the cutting torch with each corner. When alignment has been completed, the holder is tightened and the cut is quickly made. The plate is then loosened and turned for a cut on the next side—and so on till all four cuts have been made. The cutting torch is held at an angle to give the proper bevel to meet the requirements for weld-metal deposition.

The six segments of the spheres are assembled by tack welding, followed by finish arc welding. (See Fig. 4.) This is a progressive operation, as it is necessary to weld inside seams first. Thus as each part is tacked to another it is inside welded, often in one pass, with a $\frac{3}{16}$-in., all-position, reverse-polarity electrode. After the seam has been welded inside, a cutting torch is used to flame-gouge the outside to clean metal, usually to about two-thirds of the plate thickness. According to R. L. Fowler, Superior's chief engineer: "Flame-gouging takes only about one third of the time formerly used in chipping and costs only about half as much. We consider it vastly superior in removing slag and in laying the foundation for the kind of weld that pressure vessels require."

Les Armstrong, plant superintendent adds a strong commendation: "The savings in time and cost of operation are important, of course, but we feel there is another definite advantage in eliminating the nerve-wracking noise of chipping. All of the men in the shop feel better and work better since we changed over to flame-gouging."

After gouging, the seam is welded on the outside in two or three passes, usually with the same type of electrode used for the inside seam. The last segment, obviously, can be welded only from the

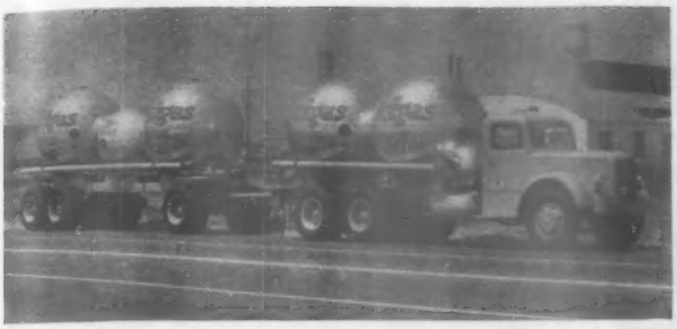


Fig. 6—Transport truck and trailer with a combined load of 7,400 gallons of propane at 250 psi (not including a 150-gallon fuel tank). This double unit was built for Imperial Gas Co., Los Angeles, by Superior Tank and Advance Body Works

Fig. 7—Welds on and between spheres on a transport truck and the piping and valve system

outside, and this is done against a backing strip.

Welded Steel Hemispheres

The large-quantity production of the 41-in., 150-gal sphere starts with the receipt of the drawn hemispheres previously referred to. These are a little oversize, and the extension of the edge is flame-cut to make a true hemisphere, trimming off about 1½ in. The half section is fitted on a positioner so that it revolves slowly past a fixed cutting torch, as shown in Fig. 5. The trimmed hemispheres are then carried by a one-ton electric hoist traveling on an overhead rail to an automatic-welding operation that joins the two parts into a sphere. The fixed overhead rail on which the hoist travels is extended by a jib crane with the same-sized I-beam. The jib crane will swing to various positions over both of the cutting operations just described.

The two drawn half sections of the 41-in. sphere are tack welded together with a back-up strip inside of the "equator." The back-up strip is made of 3/16 by 1¼ in. flat bar formed into a ring. The tack-welded sphere is placed in a Superior-designed and built welding device, where it is held by the pressure exerted by compressed air. As the sphere turns at the proper predetermined speed, the welding is done automatically by an automatic welding head having the wire fed from an overhead reel.

Fabricating Larger Spheres

Let us now look at the larger spheres, the hemispheres of which are made up of five, six or seven segments. After the plates for these segments have been cut, they are press formed in the manner previously described or dished on a large dishing machine which will handle a plate up to 15/16 in. thick and 10 ft in diameter. The dishing machine is served by a one-ton electric hoist carried on a jib crane.

The pieces for each half of the sphere are assembled and tack welded on the outside. They are then solid welded on the inside, followed by flame-gouging on the outside of the seams to clean the metal. The crane places the top half on the lower half, and the hemispheres are tack welded on the outside. A round hole, 16 in. in diameter, is left in the center of the top section to allow ingress for the weldor who finish welds the inside of the equator. The outside of the equator seam is then flame-gouged and finish welded. To complete the sphere, the round 16-in. plate is finish welded against a 1-in. back strip, fittings having been installed before the opening is sealed.

Plant Layout

Back of the dishing machine is an area containing layout tables and assembly and welding benches for arc and gas welding. Here all of the smaller assemblies are put together. Ingeniously contrived sheet-steel racks, divided into compartments by sheet-steel partitions, contain the component parts of these assemblies.

On the other side of the large-unit assembly area, hydrostatic testing is done. Parallel rails hold up to 20 of the smaller spheres. They can be emptied through grillwork between the rails, the water running off into a sump at one end of the cement-lined water channel. Also lined up on this side where they can be served by the cranes are large shears to cut plate up to 3/16 in. thick (heavier plate is flame-cut), two powerful 10-ft press brakes and two 10-ft bending rolls that will handle A-70 plate up to 5/8 in. thick. This plate is used in forming cylindrical sections for larger tanks.

All-welded stairways, catwalks and landings equipped with safety railings and safety steps are used to reach the tops of tanks and to go from one large tank to another. The stairways are built up, mostly, from angle iron, and the safety steps are punched out of steel plate on a press brake.

Tanks on Auto Bodies

Superior Tank has about 200 employees who work in the 2-acre Los Angeles plant and yard as well as in the field department and Bakersfield branch devoted to oilfield construction. The Los Angeles plant also includes the Advance Auto Body Works, an affiliated company which manufactures a great variety of special auto bodies, mostly rather large units. Gasoline, oil, propane, butane and other tanks are constructed and mounted on chassis and trailers (Fig. 6), along with all piping, valves and gauges. Welding is a major factor in this work, as is evidenced by the close-up of Fig. 7.

Supersonic Plate Testing

BY CLYDE B. CLASON

Here are the details of a new instrument which uses supersonic vibrations to determine plate quality prior to welding. Plates with sulphide inclusions are thus avoided.

A NEW device gives promise of providing a useful non-destructive means for studying the weldability characteristics of steel plates prior to welding. This instrument, the Sperry "Supersonic Reflectoscope," measures the length of time needed for supersonic vibrations to penetrate the material being tested and be reflected back to the starting point. It is thus similar to radar.

This testing method has been tried out in the Barberton, O., plant of The Babcock & Wilcox Co. since last December in order to facilitate the manufacture of pressure vessels and other steam-generating equipment. It has been this company's experience that the most troublesome defect found in arc welds of pressure vessels results from plate having subsurface segregations or inclusions which may open up under pressure to cause weld failures. For thick plates, the Reflectoscope is capable of giving a qualitative indication of the concentration of segregations and inclusions along the welding edges. By testing each plate in the manner shown in Fig. 1, Babcock & Wilcox is able to select only the ones which it knows will weld satisfactorily.

Principles of Operation

The Reflectoscope is designed to make use of three principles of physics: (1) that high-frequency sound travels in a straight line, (2) that the supersonic waves are reflected or absorbed by certain physical variations in a material and (3) that they are transmitted at a certain fixed rate depending upon the material. A quartz crystal mounted in a searching unit is applied to the surface of the material under test. As the crystal is moved over the surface, the vibrations travel through the material and are reflected back from the other side. They are likewise reflected back from any defects lying in their path through the material. If the defect is small, only part of the vibrations will be affected, as is pictured in the sketch, Fig. 2. Large defects such as voids or cracks, however, may reflect back all of the vibrations and so prevent any of them from reaching the other side.

Visual indications of the reflected vibrations are viewed on an oscilloscope screen. Fig. 3 is a reproduction of a photograph of an oscilloscope screen at the time of testing a steel billet. In this illustration, "A" is the zero sweep line with inch-mark waves. The sweep line may be adjusted so that each full wave represents any measure of distance from one inch to two feet. "B" is the initial pulse, and "C" is the reflected vibration from the other side of the billet, a distance of 8½ inches. (A depth of penetration up to 10 ft of steel is possible.) "D" is the reflected vibration from a relatively large defect approximately 4 inches from the surface. By using the "A" sweep line as a fixed scale, the exact location of the defect can be accurately measured.

It's Done with a Crystal

Basically, the instrument consists of a high-frequency oscillator and amplifier. The output of the oscillator circuit is applied to the faces of the quartz crystal. The piezoelectric property inherent in the crystal causes it to "grow" when a difference in electrical potential is applied to its faces. If the voltage is applied at a high frequency, the crystal will vibrate accordingly, producing high-frequency sound waves. The converse is also true: when a high-frequency vibration is applied to the crystal, a small difference of potential appears on its faces. It is this varying potential that is amplified and placed on the oscilloscope to produce the wave diagram. It should be noted that the oscilloscope pattern, though easily read for gross flaws like the

Fig. 1—Testing the edges of plates with the "Supersonic Reflectoscope"

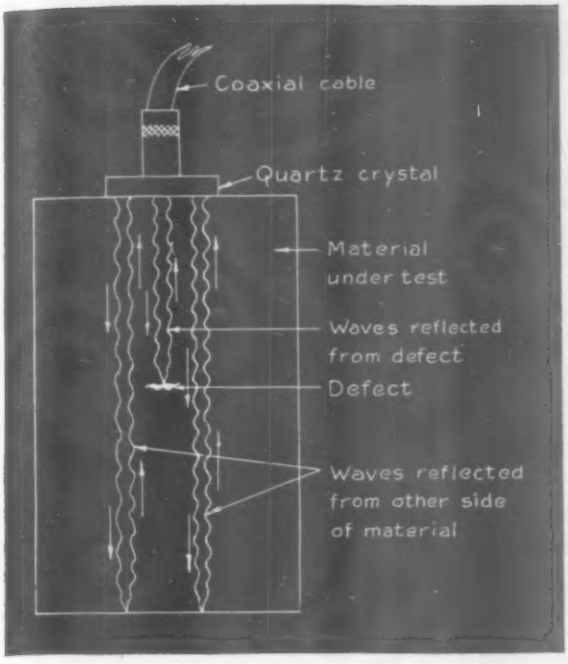
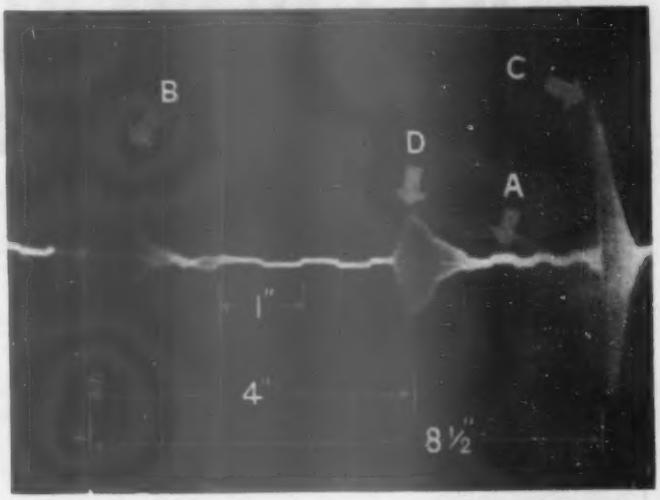


Fig. 2—The supersonic vibrations from the quartz crystal travel through the material and are reflected back. A defect keeps part of the waves from reaching the opposite side

Fig. 3—Oscilloscope screen while a billet is being tested. "D" is the reflected vibration from a relatively large defect



Courtesy Sperry Products, Inc.

one in Fig. 3, requires some degree of skill and experience to interpret when small defects are being studied.

Surfaces must be reasonably smooth and flat before the crystal can operate. Since an oil film is used to assure frictionless contact of the crystal, the material being tested must be in a horizontal position and the crystal applied vertically from above, as is shown in Fig. 1. Curved surfaces cannot be probed by the Reflectoscope unless the crystal has been especially ground to fit them, and irregular surfaces will cause grave difficulties.

The area covered by the supersonic beam is approximately equal to the area of the crystal, which is a square either ½ by ½ or 1 by 1 in. Since sound travels in a straight line, an inspection position will cover a volume of depth equal to the plate thickness and of cross-section equivalent to the crystal area.

The sound beam is transmitted into the material at a fixed frequency or wave length. The oscillator may be tuned over a range of frequencies of from 1 to 11 megacycles. As with X-rays, the higher frequencies are more penetrating, and, because of their shorter wave lengths, are also more likely to be disturbed by smaller defects. Due to practical reasons such as surface conditions, however, 5 megacycles have been found the most satisfactory for inspection purposes at the Barberton plant.

Preweld Plate Testing

The plate conditions which Babcock & Wilcox is utilizing the Reflectoscope to avoid are cracks and voids originating from sulphide inclusions. These inclusions may be arranged in segregated bands or streaks in the plate material. They are seldom found in alloy steels but may occur in any grade of carbon steel.

It is generally accepted that their cause is due to the oxidation of the sulphide impurities into sulphur dioxide, a gas which forms pockets in the steel. Under high pressure, such pockets may cause weld failure or at least open up zones of weakness in the plate at the inclusion areas or in the weld metal along columnar grain boundaries. Their effects are usually more serious in submerged-melt welding than in multipass open arc welding.

The weaknesses in a welded pressure vessel are caught by an X-ray examination, but many valuable hours may be lost daily in the repair of the defects revealed by the X-rays. Babcock & Wilcox metallurgists believed that there was a method which would show in a non-destructive manner the condition of a plate with respect to segregation concentration.

Much work still remains to be done in the study of the Reflectoscope for this application, but the results so far indicate that plates 1½ in. thick and over may easily be classified according to whether they will or will not cause trouble after being welded. Thinner plates are more difficult, but work now under way will soon indicate what success may be expected in thicknesses of less than 1½ in.

Weld Testing Tried, Too

The instrument is also being used successfully to test billets, forgings, shafts and similar objects for defects. A fully laminated plate gives a very clear and accurate indication. The Reflectoscope has proved very satisfactory for uncovering some weld defects, but it is limited by the necessity for a perfectly flat surface on which to lay the crystal. When complete examination of a weld is to be made, the obtaining of satisfactory surface conditions is a difficult problem. However, defects of very small thickness which are perpendicular to the beam, such as a tight lamination or flakes, are easily shown.

★ RESEARCH

WELDING METHODS for ALLOY-STEEL PIPING

BY ERIC R. SEABLOOM, *Supervising Engineer, Crane Co. Research Laboratories*

★ Part Two—Straight-chromium steels, with chromium contents ranging from 10 to 30%, are being widely used for high-temperature service. Mr. Seabloom discusses the characteristics of various ranges and gives welding procedures and techniques.

Welding has been extensively used in the fabrication and erection of piping for many years. So far the piping has mostly included mild-carbon and low-alloy steels, which are comparatively easy to weld. But the trend towards higher alloy steels can be expected as operating conditions for piping continuously become more exacting with the development of various new industrial processes. Alloys such as the chromium-molybdenum, straight chromium and chromium-nickel types will, no doubt, find ever wider fields of application.

Admittedly, these alloys are not as weldable as the plain-carbon steels. Nevertheless, they can be successfully welded by various welding processes provided that proper techniques and procedures are employed. In the first of a series of four articles, published in the September issue of THE WELDING ENGINEER, *Mr. Seabloom dealt with the not-too-difficult chromium-molybdenum alloy steels. This second article will deal with the somewhat more difficult straight-chromium steels, and the third will cover the chromium-nickel stainless types. The fourth and last article will be devoted to the soldering and brazing of alloy piping.*—THE EDITORS.

THERE are several types of straight chromium steels available having various chromium and carbon ranges, with some grades containing small percentages of nickel, tungsten, molybdenum, aluminum or selenium. The tabulation below lists only typical types from the American Iron and Steel Institute classifications:

AISI Type	Maximum Carbon Content	Chromium Range
410	0.15 %	10.00 to 14.00 %
430	0.12 %	14.00 to 18.00 %
442	0.35 %	18.00 to 23.00 %
446	0.35 %	23.00 to 30.00 %

These steels are primarily used on high-temperature service where resistance to corrosion and oxidation is desired. They are usually employed in oil refinery and chemical process work.

WELDABILITY CHARACTERISTICS

From the welding standpoint, the straight-chromium steels can be divided into two general groups: the hardening (martensitic) and the non-hardening (ferritic). The martensitic group of 10 to 14% chromium are decidedly air-hardening and display marked suppressed transformations upon cooling. The ferritic group of 18 to 30% chromium do not harden, even when cooled rapidly from the welding heat, since they generally have no critical transformations with normal carbon contents.

Between these two groups, there lies a range of 14 to 18% chromium steels that are partly martensitic and partly ferritic. Their behavior depends upon the chromium content with respect to the amount of carbon. As an illustration, a 16% chromium steel with low carbon content will display less hardening than 16% chromium with higher carbon. Generally speaking, the 14 to 18% chromium steels do not harden to as great an extent as the 10 to 14% chromium, nor do they develop grain growth with resultant brittleness as is the case with 18 to 30% chromium steels. However, there is no distinct line of demarcation in behavior of this group: the lower chromium content steels will act similar to the martensitic grades, and the higher chromiums will display characteristics somewhat like the ferritic types.

10 TO 18% CHROMIUM

As previously mentioned, the 10 to 14% straight-chromium steels are air-hardening (similar to the lower chromium-molybdenum grades) and are also very sluggish in transforming from the welding heat, as illustrated by Fig. 1. It is thus essential to employ relatively high preheats (300–600 F and even higher), depending upon metal thickness and design of weldment. Heat treatment is also necessary

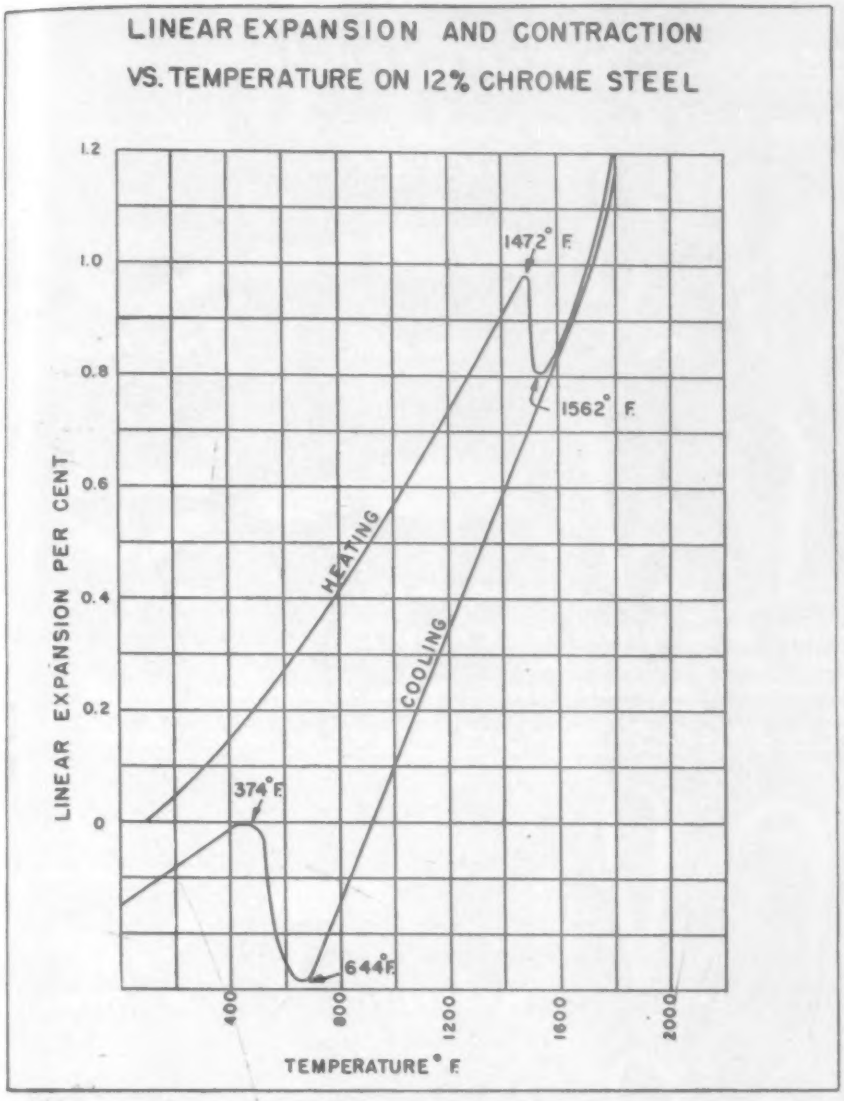


Fig. 1—Dilatometer curve on 12% straight chromium steel. The suppressed transformation on cooling occurs at a relatively low temperature where the metal is no longer plastic, thus causing internal strain

and should be done as soon as possible after welding.

In the 14 to 18% chromium group, the narrow range of 15 to 16% chromium is an important one, since this steel is highly resistant to nitric acid service and is the least difficult to weld of the straight-chromium steels. A preheat of 300 F is usually sufficient, and though heat treatment is necessary it need not be done immediately after welding.

Steels of 16 to 18% chromium in the 14 to 18% chromium group approach the nature of the higher chromium ferritic steels in that they suffer a reduction in impact strength and ductility due to grain growth and are usually non-air-hardening. Preheating at 300 F is generally employed. Since the coarse grain structure cannot be refined by heat treatment, stress relieving is often resorted to in order to reduce the danger of weld cracking.

18 to 30% Chromium

The 18 to 30% chromium steels, and particularly those in the 23 to 30% range, are primarily employed for resistance to oxidation at elevated temperatures. They are also used in catalytic refining installations instead of the more weldable chromium-nickel stainless steels because nickel is believed to have a deleterious effect on certain proc-

Fig. 2—Macrograph of weld in 27% straight-chromium steel tubing. The deposited weld metal is of similar analysis. This weld was made without preheat but was stress relieved at 1,450 F. Note the large elongated dendritic grains resulting from the welding heat

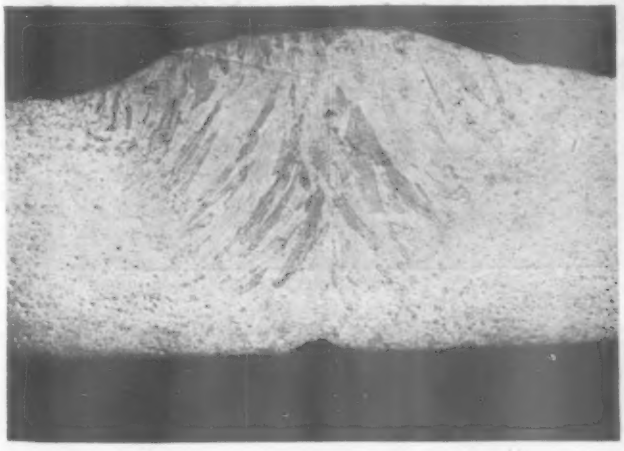


Fig. 3—Macrograph of 25/20 chromium-nickel weld in 27% straight-chromium steel tubing. A preheat of 450 F broadened the heat-affected zone and increased the grain size in the adjacent parent metal

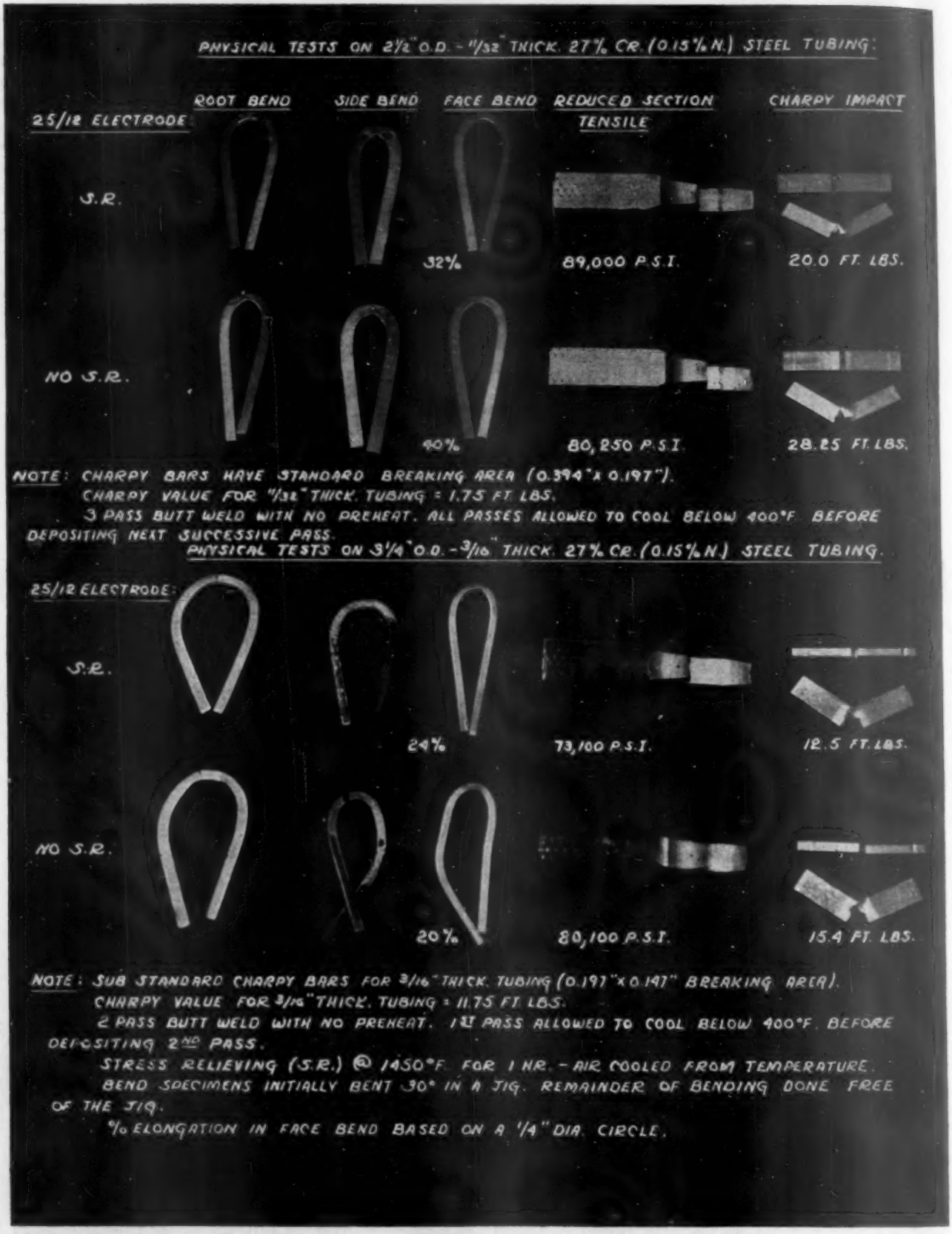

PHYSICAL TESTS ON 2½" O.D. - 1/32" THICK. 27% CR. (0.15% N.) STEEL TUBING:
ROOT BEND
SIDE BEND
FACE BEND
REDUCED SECTION TENSILE
CHARPY IMPACT
25/12 ELECTRODE:
S.R.
32%
89,000 P.S.I.
20.0 FT. LBS.
NO S.R.
40%
80,250 P.S.I.
28.25 FT. LBS.
NOTE: CHARPY BARS HAVE STANDARD BREAKING AREA (0.394" x 0.197").
CHARPY VALUE FOR 1/32" THICK. TUBING = 1.75 FT. LBS.
3 PASS BUTT WELD WITH NO PREHEAT. ALL PASSES ALLOWED TO COOL BELOW 400°F. BEFORE DEPOSITING NEXT SUCCESSIVE PASS.
PHYSICAL TESTS ON 3¼" O.D. - 3/16" THICK. 27% CR. (0.15% N.) STEEL TUBING.
25/12 ELECTRODE:
S.R.
24%
73,100 P.S.I.
12.5 FT. LBS.
NO S.R.
20%
80,100 P.S.I.
15.4 FT. LBS.
NOTE: SUB STANDARD CHARPY BARS FOR 3/16" THICK. TUBING (0.197" x 0.197" BREAKING AREA).
CHARPY VALUE FOR 3/16" THICK. TUBING = 11.75 FT. LBS.
2 PASS BUTT WELD WITH NO PREHEAT. 1ST PASS ALLOWED TO COOL BELOW 400°F. BEFORE DEPOSITING 2ND PASS.
STRESS RELIEVING (S.R.) @ 1450°F. FOR 1 HR. - AIR COOLED FROM TEMPERATURE.
BEND SPECIMENS INITIALLY BENT 30° IN A JIG. REMAINDER OF BENDING DONE FREE OF THE JIG.
% ELONGATION IN FACE BEND BASED ON A 1/4" DIA. CIRCLE.

Fig. 4—Physical tests on 25/12 chromium-nickel welds in 27% straight chromium tubing. All bend specimens displayed good ductility in both the as-welded and stress-relieved conditions. Impact values are lower when the material is stress relieved

esses. Welds are ductile at high temperatures, but very brittle at room temperature. These alloys are entirely ferritic and generally without critical points. Therefore, with the exception of mechanical working, there is no possibility of refining coarse grain growth which results from welding temperatures. See Fig. 2.

The question of preheating the 18 to 30% chromium steels is a controversial issue. Some authorities recommend 300 F while others suggest temperatures as high as 900 F. Some even suggest that preheating be eliminated, but caution should be exercised since the higher chromium steels are usually brittle below 200 F. Experience should dictate the preheating procedure.

Use of Stainless Electrodes

The straight-chromium steels are sometimes welded with 25/12 or 25/20 austenitic chromium-nickel stainless-steel filler metal. See Fig. 3. However, caution should be used in applying dissimilar metals. The coefficient of thermal expansion of the 25/12 or 25/20 chromium-nickel steels is approximately 50% greater than the straight-chromium steels. Due to this difference, high stresses may be set up during repeated heated and cooling in service, resulting in eventual failure of the welded joint. Stress corrosion may also be encountered.

The heat-affected zones adjacent to the weld, although quite narrow, will be brittle. Toughness may be imparted by annealing, but the heat treatments proper to chromium-nickel welds and the straight-chromium parent metals differ. The chromium-nickel weld metal requires higher temperatures for annealing than the temperatures recommended for some of the straight-chromium steels. Hence, a suitable heat treatment for one alloy may ruin the other. Carbide precipitation and inferior corrosion resistance may also result when austenitic weld deposits are annealed in accordance with recommended procedures for the straight-chromium steels.

Regardless of the difficulties mentioned above, probably the best method of welding the 23 to 28% chromium steels is to employ 25/12 or 25/20 chromium-nickel filler metals, since this is about the only way of obtaining ductile welds (Fig. 4) in this most difficult group of steels to weld. Careful consideration, however, should be given to the service requirements.

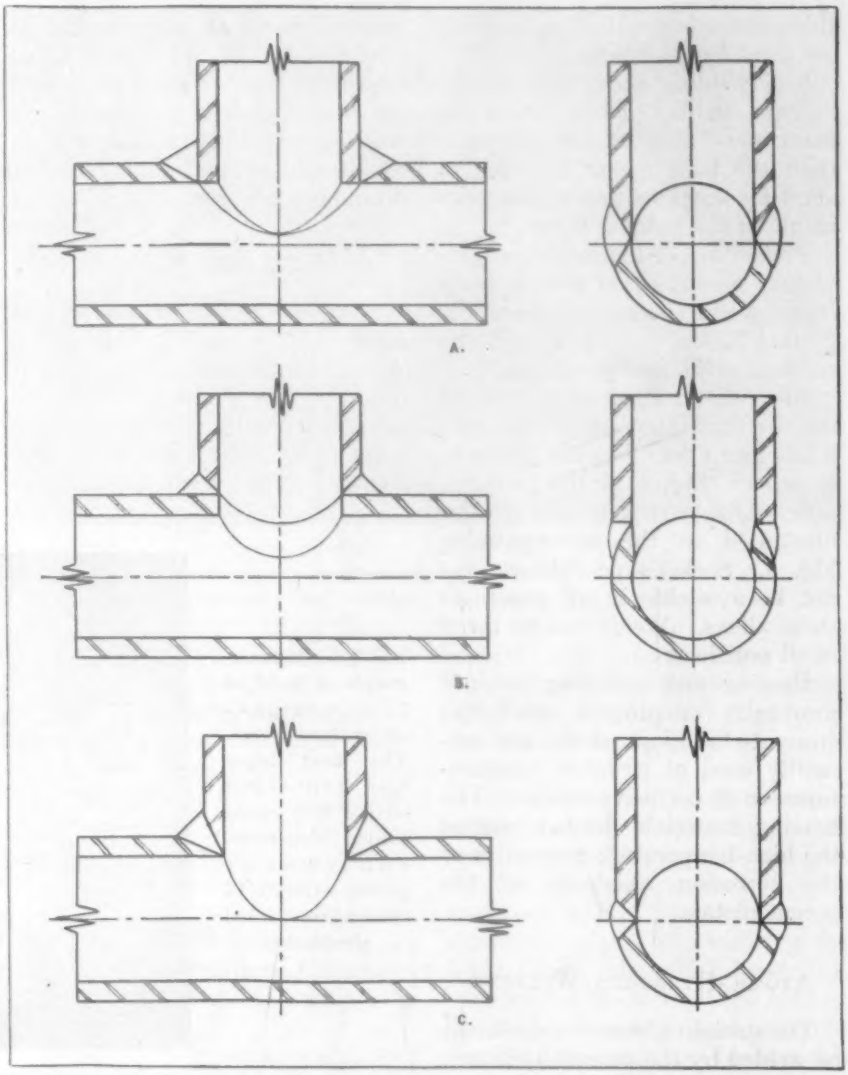


Fig. 5—Welding grooves recommended for joining nozzles to piping.

When proper procedures for preheating, welding, stress relieving or heat treatment are followed, the welds in straight-chromium steels will meet the requirements of the ASA Code for Pressure Piping on procedure and operator qualification tests.

Oxy-Acetylene Welding

The oxy-acetylene flame can be employed to weld straight chromium steels if certain precautions are adhered to, but there are some limitations, especially, in the higher chromium types. Weld rods of proper analysis are not always available, and (as explained in the previous article) flame adjustment is important. Suitable fluxes are also necessary to dissolve the chromium oxides.

The thermal conductivity of straight-chromium steels is about 50% less than that of plain-carbon steels. Heat is retained longer, therefore, and a smaller flame is recommended to reduce the possibility of overheating and boiling of the metal. On the higher chromium steels, excessive heating causes grain growth and impairs ductility in the adjacent base metals. As it is practically impossible to prevent excessive grain growth when 23 to 30% chromium steels are oxy-acetylene welded,

this process is not used extensively for these ferritic alloys.

The welding rods used should contain slightly higher chromium, manganese and silicon contents than the base metal in order to allow for the reduction of these elements in the welding flame.

Preheating of temperatures previously mentioned is generally accomplished by means of the welding torch. Heat treatment will be covered in a larger paragraph.

The welding grooves recommended are the single-vee butt joints and fillet or socket joints as shown by Fig. 4 in the previous article* and the nozzle weld grooves illustrated in the accompanying Fig. 5. Socket-type fittings may not be available in all grades of these alloys. Welds can be made in all positions.

Brazing and soldering are not generally employed since the straight-chromium steels are primarily used at elevated temperatures or in corrosive media. The brazing materials do not possess the high-temperature properties or the corrosion resistance of the parent metals.

Atomic-Hydrogen Welding

The straight-chromium steels can be welded by the atomic-hydrogen process, but it is not extensively used in the welding of piping. This process is best adapted to the lighter gauges of pipe wall and to the lower chromium ranges. No flux is required because the hydrogen atmosphere around the arc stream helps to reduce the chromium oxides. The bare welding rod should be of about the same chemical composition as the base metal or, possibly, slightly higher carbon content to compensate for the loss encountered in welding.

In the 18 to 30% chromium grades, the heat from the arc and hydrogen flame tends to overheat the deposited and adjacent parent metals, resulting in excessive grain growth and lowered ductility.

Preheating of the base metals to temperatures previously described is usually adequately supplied by the process itself. Welding grooves such as single-vee butt joints and fillet or socket joints (shown by Fig. 4 in previous article) are recommended, also the nozzle weld grooves illustrated in Fig. 5. Welding should preferably be in the downhand position.

Metal-Arc Welding

Metal-arc welding is the process most widely used to join the straight-chromium steels, and it produces the most favorable results. Generally, the process provides close control of the carbon content. The electrode coatings protect the arc stream from atmospheric gases and also compensate for chromium losses.

As a rule, the best technique in arc welding straight-chromium steels is to use a relatively short arc length, but this will vary with the grade of alloy and type of electrode coating. A long arc generally results in improper protection against chromium oxidation and so reduces the chromium content of the deposited metal. The welding current should be slightly lower than that used with mild steel, especially on the first to second layers. This, again, will depend upon the alloy, type of coating and ability of the operator. The combination of too high a heat and too long arc length will boil the weld metal and thus cause porosity.

In filling weld craters, care should be taken to avoid cracks. It is considered good practice to grind all improperly formed craters before the next pass is deposited. It is also advisable to grind the first two layers of weld metal to a smooth finish and to remove any defects that appear in the weld deposits by grinding. Proper fit-up between the parts to be joined is essential for best quality of workmanship.

Recommended Electrodes

Coated electrodes giving the same analysis of the deposited metal as the base materials are generally available and should be used, except with the 23 to 30% ferritic chromium types, for which 25/12 or 25/20 austenitic chromium-nickel electrodes are preferred.

Fig. 6—Macrograph of weld in 27% straight-chromium steel. The first layer was deposited with a 28% chromium electrode, subsequent passes with 25/12 chromium-nickel electrodes

When it would be detrimental to have chromium-nickel welds exposed to certain internal fluids, the first pass can be made with 23 to 30% straight-chromium filler electrode and subsequent passes with 25/12 or 25/20 electrodes, as shown in Fig. 6. It is recommended, however, that careful consideration be given to the difficulties in the use of dissimilar metals previously discussed.

Welds can be made in all positions, but downhand work is preferred. The electrodes should be generally smaller in size than those employed on plain-carbon steel, seldom exceeding $\frac{3}{16}$ in. in diameter. The types of welding grooves recommended for arc welding are the single-vee butt joints with or

* Page 35, The Welding Engineer, September, 1946.

without backing rings and lap filler or socket joints, also the nozzle weld joints shown in Fig. 5.

Preheating for Arc Welding

Some of the straight chromium steels require preheating at temperatures previously mentioned. Preheating is particularly desirable for the air-hardening chromium steels as it retards the cooling rate and prevents weld cracking. Preheating can be accomplished by oxy-acetylene torches, suitable gas burners, induction coils or resistance coils. The heating should be gradual and uniform and the temperatures maintained during welding operations. The temperature can be checked by heat-indicating tablets or sticks, surface pyrometers or thermocouples.

Heat treatments of piping assemblies in the straight-chromium alloys generally consist of annealing or stress relieving. The treatment depends upon the service requirements, grade of base metal, type of filler metal, shop or field fabrication and furnace equipment involved.

The 10 to 14% chromium range welded with filler metal of similar analysis should be annealed at 1,550–1,650 F and furnace-cooled to at least 1,100 F. Another treatment can also be used if this type of steel is welded with 25/12 or 25/20 chromium-nickel austenitic stainless filler metal; namely, heating to 1,400 F followed by slow cooling. The heat treatments should preferably be made as soon as possible after welding.

The 15 to 16% chromium steel welded with 16% chromium filler metal should be annealed at 1,450–1,550 F and furnace-cooled to at least 1,100 F. If welded with 25/12 or 25/20 chromium-nickel austenitic filler metal, stress relieving at 1,400 F followed by slow cooling may reduce the hardness of the heat-affected zones in the parent metal sufficiently to be satisfactory for some applications.

Stress relieving is usually sufficient for the 16 to 18% chromium steel, when welded with either 18% chromium, 25/12 or 25/20 chromium-nickel filler metal, as this alloy does not respond well to heat treatment. Heating to 1,450–1,500 F followed by air cooling will relieve the residual stresses.

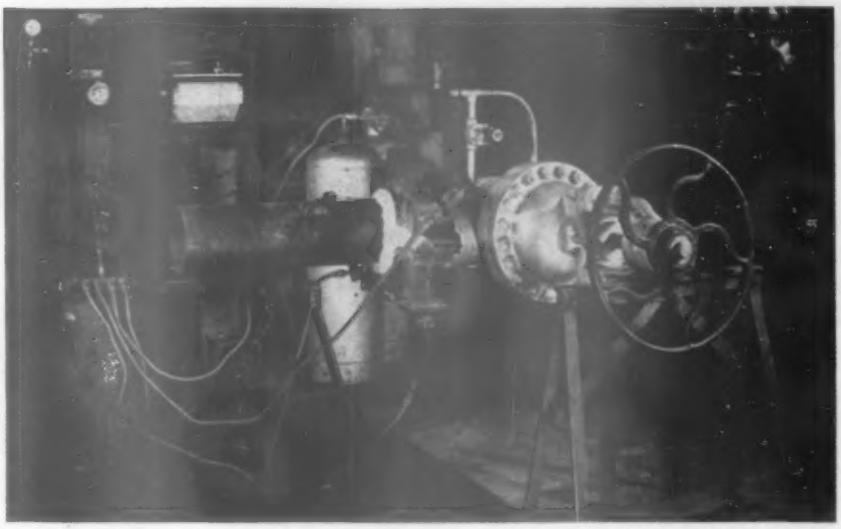


Fig. 7—Stress relieving a welded joint by means of a gas-fired, portable clamp-on furnace. Induction or resistance coils can also be used

The 18 to 30% chromium ferritic steel welded with filler metal of similar analysis is usually heated to 1,600–1,650 F for a considerable length of time, followed by rapid cooling, in order to obtain maximum ductility. Even with such treatment, the welds will be quite brittle and may not be satisfactory for most service conditions. Furthermore, treatment of this kind is often not practicable.

When welding is done with 25/12 or 25/20 chromium-nickel filler metal, stress relieving at 1,450–1,500 F gives somewhat better results. On light-wall thicknesses, stress relieving may even be dispensed with—recent tests have shown that stress relieving does not affect the ductility but does lower the impact strength of austenitic welds.

Stress relieving can be done either in a heat-treating furnace or by local means, employing gas burners, a clamp-on fired furnace as shown in Fig. 7 or induction or resistance coils. The width of the heated circumferential band (incorporating the weld at the center) should be equal to at least twice the width of the weld, and beyond this zone the temperature should diminish gradually. Heat treatment is generally done in furnaces to enable the whole structure to be heated as a unit, illustrated in Fig. 8.

Fig. 8—Heat treatment of alloys is generally accomplished in furnaces

How to Build a

The most commonly used apparatus for general preheating is a temporary firebrick furnace fired with charcoal. Such a furnace can be easily erected by following the simple instructions given here.

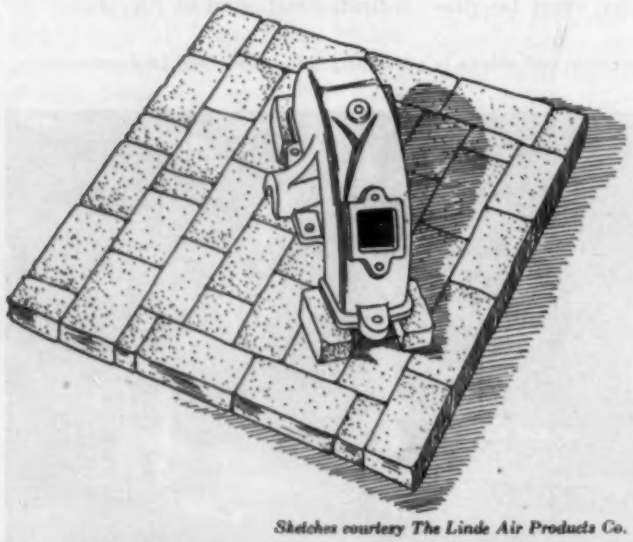
A TEMPORARY firebrick furnace is very useful for preheating cast iron and other non-ductile metals subject to expansion and contraction stresses which might distort or fracture the part. Such a furnace is built to suit the individual needs of a particular job. Hence its size will depend upon the size of the casting to be preheated. Enough space should be left between the brick wall and the casting to allow for fuel and to permit the casting to be turned, if that is necessary during welding.

BEGIN WITH THE FLOOR

First, the furnace floor should be built. The bricks are laid closely together, and a few shovelfuls of dry sand are spread over them. The sand serves to fill up the cracks and prevent embers or drops of molten metal from accidentally escaping to start a fire.

A casting that is particularly heavy or cumbersome should be positioned on the furnace floor before the walls are built, as shown in Fig. 1. The walls should be built up a bit higher than the top of the piece to be welded. To provide the necessary draft, several 2-in. spaces are left in the first course. Bricks are then placed on end near each opening to act as dampers (see Fig. 2).

The final step is to place two bricks on edge on the top of the wall. A steel rod or light angle iron is laid across them to support the asbestos-paper roof.



Sketches courtesy The Linde Air Products Co.

Fig. 1—The bricks must be laid closely together to form the furnace floor. The casting is put in welding position in order to gauge the height of the walls

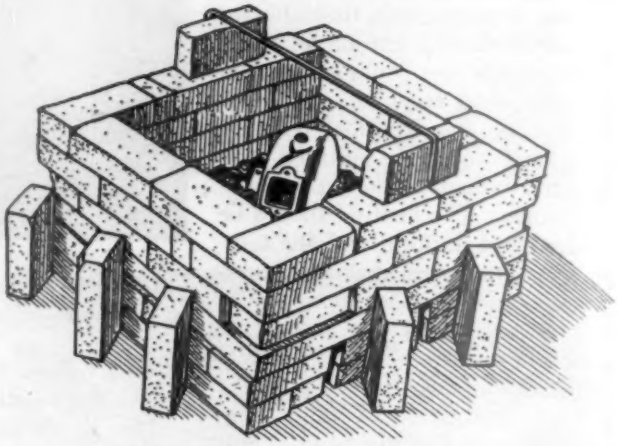


Fig. 2—Openings to provide draft are left at intervals in the lower course. The upright bricks act as dampers. Bricks and rod at top support the asbestos roof

Charcoal is the most suitable fuel to use for preheating because it requires no forced draft to burn, gives off no soot or smoke and produces a steady, constant temperature. Gas, oil or kerosene torches are sometimes used instead of charcoal. Coke should never be used because it gives too high a temperature and too localized a heat.

Before the casting is placed in the furnace, the entire bottom should be covered with charcoal, as shown in Fig. 3. The casting should be supported on bricks or pieces of bricks (Fig. 1) in order to permit it to be preheated from underneath. The supports also serve to prevent the casting from sagging and to place the weld in a horizontal position.

With the casting in the proper welding position, more charcoal is strewn loosely all around it. Not too much charcoal should be used, however, for it is likely to overheat the casting. The most fuel should be placed around the heavier sections, which do not heat so quickly as the thin parts.

The fire can be started with an oxy-acetylene flame—either by moving it over the charcoal or by holding it for a few seconds in each draft hole at the bottom of the wall. When the charcoal begins to glow evenly, the furnace should be covered with a sheet of asbestos paper (Fig. 4). To make sure that all of the charcoal is thoroughly ignited, a blast from a compressed air hose may now be introduced for an instant through each of the bottom draft holes. *Do not use oxygen or the oxygen hose for this purpose.*

Once the fire has been started, it should be watched and regulated so that the casting will be heated uniformly. This means closing or opening draft holes,

★ OPERATION

Charcoal Preheating Furnace

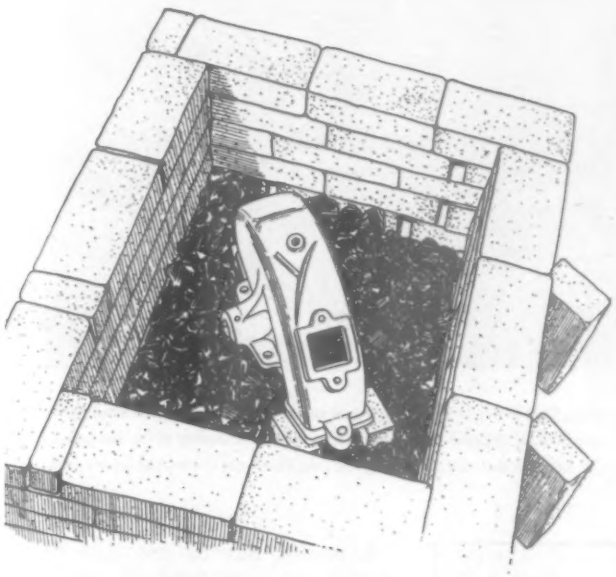


Fig. 3—The bottom of the furnace is covered with charcoal, and the casting is placed on its brick supports. More charcoal is then strewn loosely around it

moving hot coals around and adding fuel wherever necessary. Fresh fuel should be added only around the heavier sections to avoid overheating of the thin sections.

How To Test The Temperature

After the fire has been allowed to burn for half an hour or so, it is time to check the temperature of the casting. A flaplike break in the asbestos paper (Fig. 5) is made for this purpose and to expose the part for welding. The most accurate method to test the temperature is by the use of temperature-indicating crayons or pellets. If these are not available, rub a splint of soft pine against the casting; if the wood chars, the part is ready for welding. A more accurate test can be made with a small lead button. This is secured by melting a small amount of lead from a lead bar and allowing it to solidify before placing it on the casting. When the button is melting slowly, the temperature of the casting is about 600 F—the desired preheat temperature for ordinary cast iron.

As soon as the proper temperature has been reached, the casting is welded through the flaplike break in the asbestos paper. The two bricks at the top of the wall can be removed to lower the paper for welding. To protect the weldor from the furnace heat, another piece of asbestos paper is loosely folded three or four times and placed on top of the furnace.

Slow cooling (annealing) is necessary to prevent the welded casting from becoming hard and brittle. This is automatically accomplished in a preheating furnace of this type; it is only necessary to close the asbestos flap, place the folded asbestos paper over it and move the damper bricks in front of the draft holes. The fire is then left to burn itself out. For best results, the casting should not be removed until it is completely cold.

Fig. 4—The glowing fire is covered with asbestos. A blast from an air hose can now be introduced through the draft holes to spur the fire—never use oxygen!

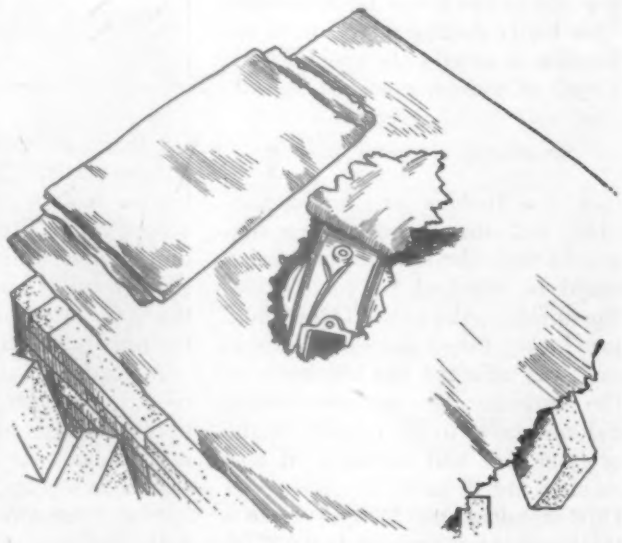


Fig. 5—A flaplike break made in the asbestos roof exposes the casting for welding. A sheet of folded asbestos paper will protect the weldor from the heat

★ MAINTENANCE

Eroded Steam Turbine

Fig. 1—Right center shows copper plate inserted to receive sprayed metal. Before spraying, the heads of the drive screws (set in to strengthen the badly eroded rib) were cut away with an oxy-acetylene torch

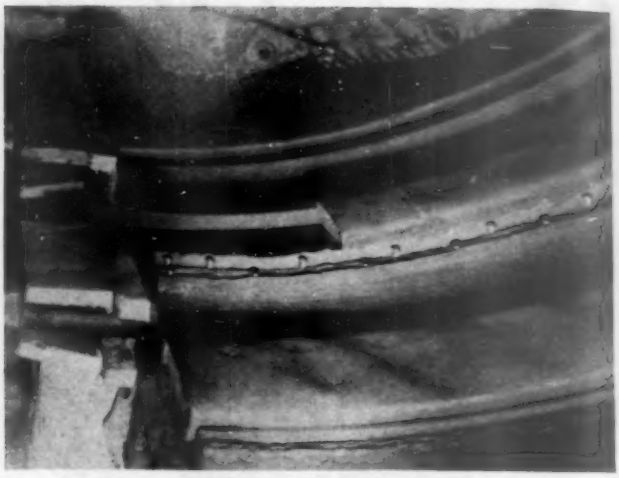


Fig. 2—Wooden blocks covered with sheet-rubber packing were fitted in the channels between ribs to protect surfaces not to be grit blasted and metal sprayed

Stainless steel applied by metal spraying effectively checked the ravages of erosion on the housing of a New England steam turbine.

BY HENRY M. ATWOOD
Field Engineer,
Metallizing Co. of America

THE HOUSING of a steam turbine installed in 1919 in a New England powerhouse had been suffering for a period of 23 years from progressive erosion caused by wet steam. Finally, inspection revealed, the condition had reached a point where the turbine would have to be scrapped unless some way could be found to halt further deterioration. It was also necessary to restore one section where the area of an edge holding one of the ribs in place was badly eroded. This badly damaged section of the housing is clearly shown in Fig. 1. Depth of erosion averaged 5/8 in.

Stainless Stops Erosion

A new turbine was not obtainable, but the manufacturer suggested that the ravages of erosion could be checked by metallizing. Fortunately, the erosion which had previously taken place had not in any way affected the efficiency of the turbine. On sections which did not need to be rebuilt to the original size and strength, it was recommended that a coating of 18/8 stainless steel be sprayed to a thickness of approximately 0.025 in. This would not restore the original dimensions, but it would be sufficient to arrest further deterioration for the remaining life of the other turbine parts. The action of superheated steam traveling at high velocity has little corrosive effect on stainless, which, for this reason, is now being widely used for the buckets or moving elements of high-pressure steam turbines.

A copper plate was inserted to receive the sprayed metal on the badly eroded rib. Before spraying, it was necessary to set in drive screws to strengthen the rib. The heads of the screws were cut away with an oxy-acetylene torch in order to eliminate overhangs under which carbon pockets might be formed.

In order not to mar the finish of the channels between the ribs, masks were made of wooden blocks covered with sheet-rubber packing. These were fitted tightly in place, as illustrated in Fig. 2.

The upper half of the turbine was metallized first. A round framework was erected around it to carry tarpaulins. The tent thus formed served to confine the steel grit used in blasting the sections to be sprayed and to prevent the scale and dust blasted out of the housing from getting into surrounding machinery. The blasting operation (Fig. 3) was carried out one section at a time, and the metal spray was applied immediately after each section was blasted in order to eliminate any possibilitity of contamination or oxidation of the prepared surface.

Jig for Metallizing Gun

Fig. 4 shows the jig devised to hold the metallizing gun at a constant distance from the surface. This jig relieved the operator of the strain of holding the gun during the spraying process and insured an absolute uniform thickness of coating on all treated surfaces. To make it, an angle iron was bolted across the turbine housing, and a

Salvaged by Metallizing . . .

Fig. 3—Grit blasting prepared the surfaces to receive the sprayed metal. The tarpaulin built a "tent" that protected the equipment from flying grit particles

Fig. 5—The turbine casing after metal spraying. A 0.025-in. coating of 18/8 stainless steel will halt further erosion for the life of the other turbine parts

length of pipe was welded at right angles to the bottom of this angle iron. A short length of shaft was inserted in the pipe, and the end of the shaft was drilled for a rod that could be locked into position with a set screw. The metallizing gun was fixed at one end of the rod by means of its toolpost mounting, and a counterweight was welded to the other rod end.

The completed upper half of the casing is shown in the lower part of this photograph (Fig. 4). The areas treated with steel grit may easily be distinguished by the light gray appearance of the stainless steel. After the turbine has been in service for some time, the action of the steam and water thrown off by the rotor will automatically polish away the matte surface and present a bright, tough, non-corrosive surface which will resist attack for many years. The appearance of the built-up rib may be more clearly seen in Fig. 5; note that a great proportion of the original area of this member has been restored.

Fig. 4—Jig devised to maintain the metallizing gun at a constant distance from the surface being sprayed. This simple device enabled the operator to apply a uniform coating of sprayed metal and relieved him from fatigue

What It Cost

The estimated cost of this job was as follows:

50 lb of stainless steel metallizing wire at 70¢ per lb	$35
800 lb of steel grit at 6½¢ per lb. (This grit may be used many times for other purposes)	52
Labor—two men, 45 hours each at $1 per hour	90
2 cylinders of oxygen at $4 each	8
1½ cylinders of acetylene at $6 per cylinder	9
Miscellaneous materials—lumber, rubber sheeting, etc	20
	$214

Thus, by metallizing, a piece of equipment costing over $60,000—and not replaceable at any price—was restored to service for less than $215.

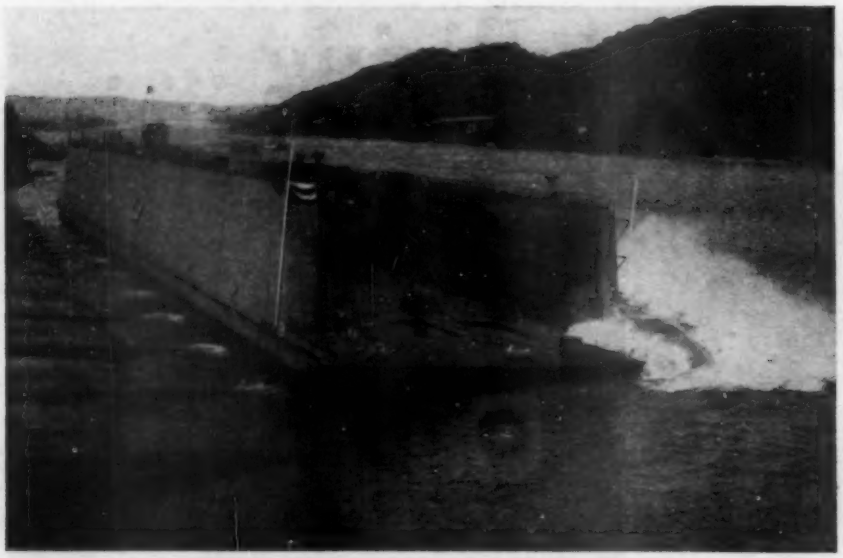


Fig. 1—The ARD-33, giant ship-lifting drydock, hits the water of the Ohio. It was built at the Neville Island yards of Dravo Corp., Pittsburgh

All-Welded Floating Drydock

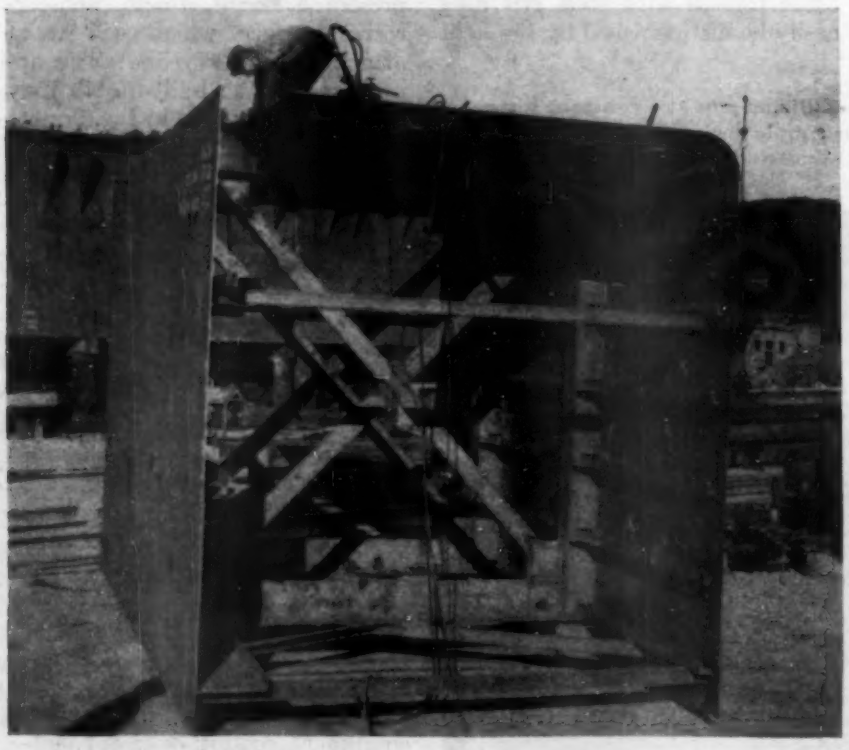


Fig. 2—Sections were prefabricated and moved to the construction area as needed. Here is a box section being readied for movement to the building ways, where it will be positioned and welded to the main structure

The new ARD-33 has a lifting capacity of 6,000 tons and will be used for ship repairs far from major bases. It contains over 73 miles of welding.

WHILE thousands of Pittsburghers looked on, the largest vessel ever built on the inland rivers of America was launched into the Ohio river last August (Fig. 1). This vessel is the all-welded ARD-33, a floating drydock designed to serve auxiliary or tender-type ships as well as Liberty ships. Before beginning its seagoing career, the ARD-33 will have to be towed 2,000 miles, through the locks of the Ohio river and down the Mississippi. It is non-self-propelled, since drydocks of this class are moved infrequently.

COLOSSUS OF THE SEAS

This shiplifting giant is 448 ft long, 97 ft wide and 45 ft high. Defined by the Navy as an auxiliary repair dock, the ARD-33 has a lifting capacity of 6,000 tons and is designed to accommodate a crew of 130 men and 7 officers. It was built for the use of the Bureau of Ships by Dravo Corporation at its Neville Island yards, Pittsburgh, under the supervision of the Bureau of Yards & Docks, Navy Department.

The gigantic structure contains more than 73 miles of welding. In erecting the ARD-33, Dravo used its usual method of fabricating subassemblies in shop and platen areas. These subassemblies were moved as needed to the building ways via railroad flatcar, positioned and then welded to adjoining sections. An example is provided by Fig. 2, which pictures a box section being readied for movement to the building ways. This method of preassembling sections was used successfully by Dravo in producing 150 LST's for the Navy.

Welding techniques were developed in conjunction with the Bu-

reau of Yards and Docks. Automatic welding played an important part in the shop fabrication of the subassemblies. Scaffolding was welded to the side walls (Fig. 3) to facilitate the speed of erection.

Built at a Slope

Because of its size, ARD-33 could not be launched in the conventional manner. To avoid excessive stresses that might be caused by launching, the flat bottom of the dock was erected parallel to the sloping ways. This meant building the vessel at a slope—an angle of 1½ in. in 12 in. As soon as the well deck was assembled, a full-revolving rail-mounted traveling crane was placed in the well to facilitate erection of the wing walls and the placement of machinery. The crane's capacity was 30 tons at a 35-ft boom radius.

Getting the 135-ton weight of the crane aboard the vessel was an engineering job of its own. Eight 50-ton jacks were employed to raise the crane 22 ft, and at that height it was transferred to rails laid on wood cribbing. These rails were joined to those already laid on the well deck, and the crane then moved aboard under its own power. It was removed prior to launching by reversing the procedure without the jacks; the crane simply rode down inclined rails to the ground level.

As shown in Fig. 4, the well deck sloped towards the river. The crane, naturally, had to be in a vertical position, which meant that the riverside crane rail had to be elevated 7½ ft above the deck itself while the shoreside rail was snug to the deck. As construction proceeded, the crane's position—resembling a house set on a sloping plateau—excited much interest among travelers on the Pennsylvania Railroad and motorists.

The drydock, now undergoing completion at an outfitting deck, will experience unique submergence tests before leaving Dravo care. Since the deepest pools of the Ohio river in the Pittsburgh vicinity are only about 16 ft, it is obvious that the dock, in submerging, would rest on the river bottom before it could reach its test depth. The

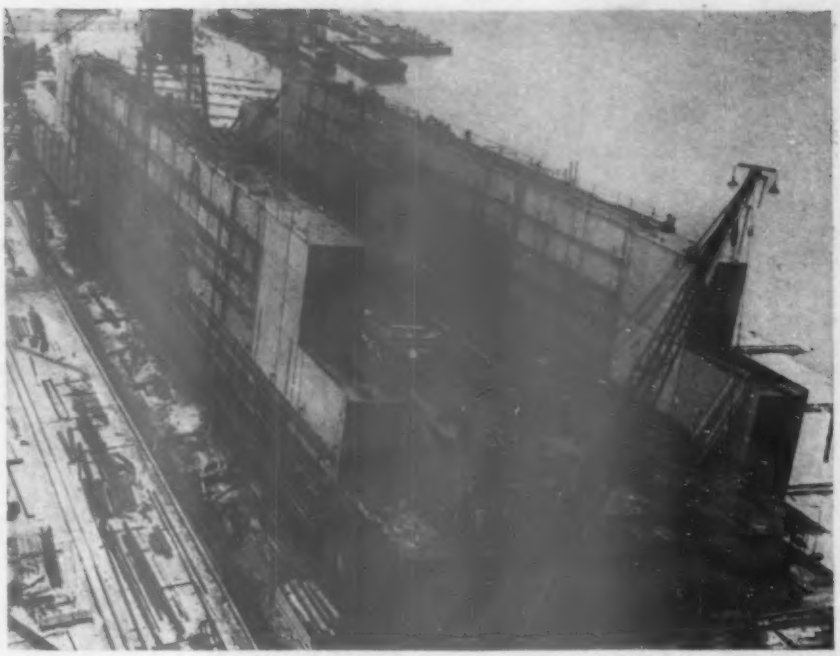


Fig. 3—Scaffolding was welded to the side walls in order to facilitate construction. The floating drydock contains more than 73 miles of welding

Fig. 4—To avoid stresses in launching, the ARD-33 was built with its flat bottom parallel to the sloping ways. The angle of slope was 1½ in. in 12 in. Note how the "whirley" is kept in the proper vertical position

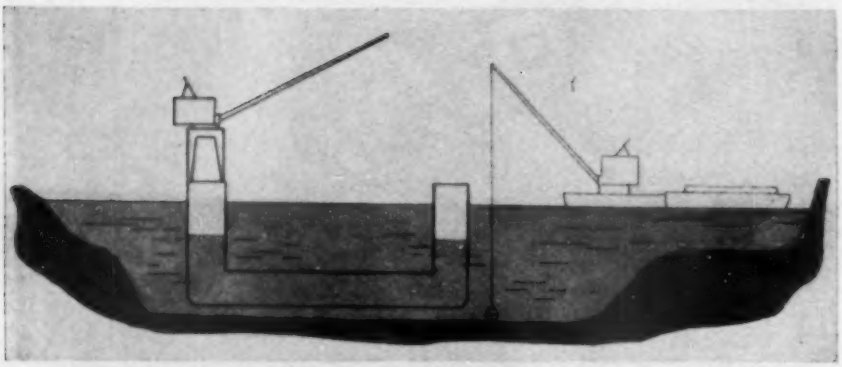


Fig. 5—This sketch shows how U.S. Army Engineers dug a 45-ft "hole" in the Ohio river to permit the ARD-33 to undergo its submergence test

sketch, Fig. 5, shows how U. S. Army engineers supplied the answer to that one. They simply dug a hole, 500 ft long by 150 ft wide, in the river bottom, just above the Montgomery dam near Rochester, Pa. There will be 45 ft of water in the "hole"—ample for testing the ARD-33.

While these river tests are needed to determine accurately the time required to submerge and emerge, it is now believed that the dock can be lowered to receive a vessel in less than 30 minutes and subsequently emerge by pumping out its tanks in about two hours. Eight watertight tanks are located on each side of the watertight longitudinal bulkhead that runs the entire length of the hull. These 16 tanks provide the means for submerging and raising the dock. Each of the 16 is served by a pump and flooding valve, and all tanks can be filled or pumped out individually or simultaneously. Control is maintained from a central station, and pumping or flooding is regulated, according to an indicating system that shows the dockmaster the depth of water in all compartments at all times.

Floating Hospital for Ships

The new drydock is a wholly self-contained unit. It has its own water distillation plant, sanitary disposal facilities, Diesel-electric generator sets for light and power. Machinery spaces, workshops and crew quarters are contained in the 12-ft-wide side walls, and the crew quarters are such that the men will be comfortable in any climate. Recreational facilities include a soda fountain and a moving picture projector. The tremendous storage capacity available for food, repair parts and material permits the vessel to operate many months at remote locations.

Two full-revolving, rail-mounted gantry cranes, each of 20-ton capacity, will operate from either side of the wing wall deck. Rail joints are welded, and rail clips and plates are welded to the deck itself. Scuppers are formed from extra-strong steel pipe and have bells of welded steel plate.

Doors and windows are provided with spring-bronze weather stripping. Chain pipes are of fabricated steel. Concrete keel blocks are provided for the docking chamber because of the prevailing scarcity of suitable grades of lumber.

Because of the great weights and forces involved, the docking and undocking of a vessel is a highly complicated technical operation. Crewmen assigned to the ARD-33 will have had either previous drydock experience or training at the Navy's floating drydock school.

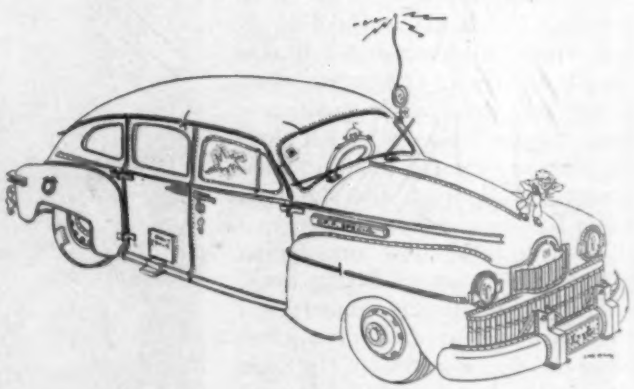
Another War Baby

Until 1939 the Navy owned only two sizeable drydocks—the *Dewey* and the ARD-1, the latter also built by Dravo Corp. Their value was determined in the long sea struggle against Japan, conducted thousands of miles from major naval bases, which brought about remarkable developments in floating drydocks. The Navy early saw the need and embarked on a drydock construction program with the objective of keeping the fleet at maximum efficiency at all times.

During the last year of the war, more than 7,000 ships were lifted out of the water by floating drydocks for repair or reconditioning. Most of these docks were located in the forward areas, and some were in the actual combat zones. Three major battleships which participated in the second battle of the Philippine Sea would have been thousands of miles from the scene had it not been for these docks, which saved them voyages back to distant bases for repairs.

☆ ☆

Late Model Weldmobile



When L. M. Benkert, general sales manager of Progressive Welder Co., was giving a talk on resistance welding before the Detroit chapter of the Society of Body Engineers, he was presented with the accompanying drawing of a late model Weldmobile. Knowing Mr. Benkerts' continuous crusade for designs which furnish better access to welding, the body engineers had put their heads together to devise the creation shown here. The "X's" indicate the welds.

★ PRODUCTION

Welded Aluminum "Blitz" Cans

BY A. B. CARLSON
Chief Engineer, Conco Engineering Works

Photos Courtesy of Sciaky Bros., Inc

Fig. 1—This overhead conveyor carries can parts through preweld cleaning stages at Conco and to the welding machines; it also conveys the welded cans through the various finishing steps described in the accompanying text

A clever combination of spot and seam welding provides U. S. Marines with watertight, corrosion-proof cans for the storage and transportation of liquid foods.

EVERYONE in the services will remember the good old 5-gallon steel blitz can. Designed primarily to transport gasoline, it also helped to move drinking water, coffee, lemonade and other liquid foods—to say nothing of dozens of other improvised services such as shower baths and life preservers.

Steel cans intended for foods require a special lining to avoid contamination. This coating did not stand up well under severe field usage and often allowed corrosion to begin on the inside of the can. The lined can was then no more serviceable for food than an ordinary steel one.

Fig. 2—The first assembly operation is to spot tack the can body

Use Aluminum Cans

To avoid the disadvantages of lined steel cans, the U. S. Marine Corps had the happy idea of standardizing upon aluminum, taking advantage of both its non-corrosive qualities and light weight. The material selected was 0.051 in. thick 52S aluminum alloy. Though made of heavier gauge material, the aluminum can was only about half the weight of the steel can.

Each can consists of seven components: (1) deep-drawn head stamping, (2) wrap-around body, (3) bottom, (4) handle, (5) spout, (6) cap and (7) locking clamp for the cap. All of these were to be joined by resistance welding with the exception of the spout, which was inserted in the head by a mechanical lock seam. Production was required at the rate of 800 aluminum cans per eight-hour shift.

This large order was placed with the Conco Engineering Works, Mendota, Ill. Since we had already made over 6,000,000 steel cans, the Marine Corps felt that

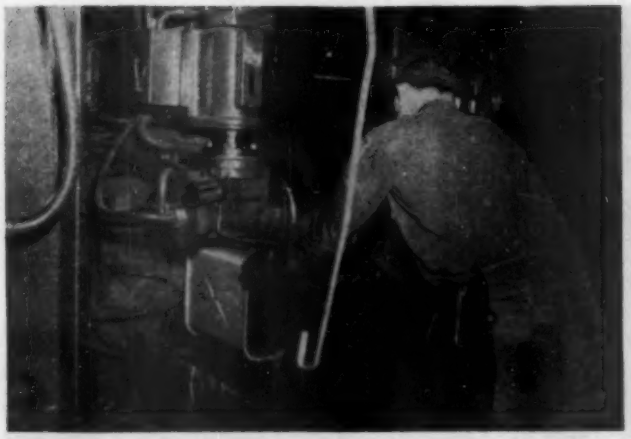


Fig. 3—After tacking the body, the vertical, pressure-tight seam is welded on a longitudinal seam welder

Fig. 4—While the body is being welded, another spot welder joins the handle to the head of the can

our engineers were well qualified to solve the design and production difficulties involved in the manufacture of the aluminum cans.

Stored-Energy Spot Welders

As the anticipated power demand on the local supply was considered to be a serious problem, Conco chose stored-energy spot welders of the type employing an electromagnetic reactor to store the high energy required. When the exact amount of energy needed for the spot weld has been accumulated, the reactor instantly discharges, and the stored energy is transformed into welding energy through the secondary turns of the reactor.

Four 50-kw spot welders are used to do tack welding and structural welding on the cans. All of these machines employ the "variable-pressure" principle, which provides a high initial pressure during the preheating current, a reduced pressure during welding to increase contact resistance, and finally a high forging pressure to insure sound welds.

An ingenious electrical interlocking eliminates excessive instantaneous load on the line by allowing only one welder of the four to draw current at any particular split-second period.

The high production schedule called for more seam-welding equipment for aluminum than had ever been installed in any one plant. Again, the limited local power supply posed problems. This time, they could not be solved by stored energy, which is not practicable for seam welding.

The six a-c seam welders used for this job are provided with series capacitors to bring the power factor to near unity. To further protect the power company's other customers from light flicker, a dummy load of kva capacity equal to the seam welder was installed with each machine. These loads are controlled to draw current during the 6 cycles the machine is off and

Fig. 5—The body is placed on a jig, aligned with and clamped to the head. Eight spot tack welds are made on the flange

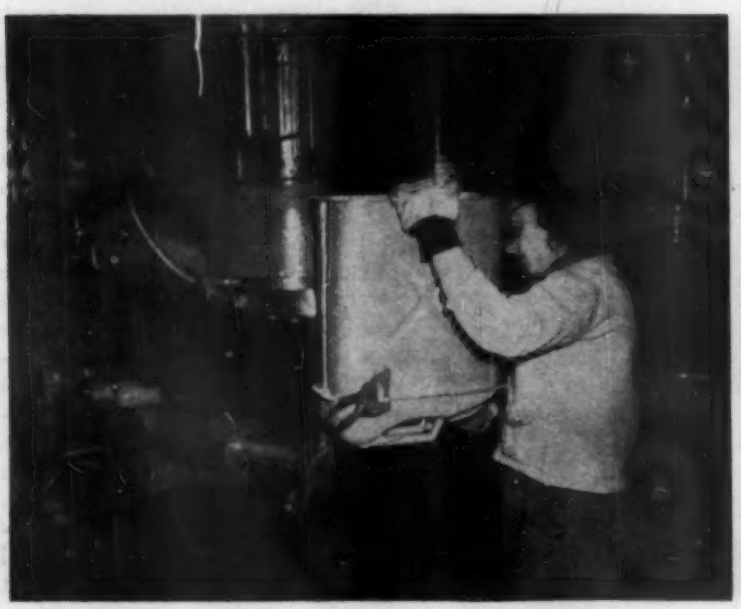


Fig. 6—After the head has been tacked in place, the flange is circular seam welded

switch off during the 2-cycle weld period. Thus a constant load on the line is assured.

The seam welders are of two types, basically similar. Four machines are arranged for circular welding, and these join the tops and bottoms to the bodies of the cans. The vertical seams are welded on two longitudinal seam welders. Both types are rated 225 kva at 50% duty cycle with a power factor of 87%.

Overhead Conveyor System

Assembly was greatly facilitated by an entirely mechanized conveyor system (Fig. 1), which carries the parts through a cleaning bath to remove dirt and oil, a fresh water rinse, a deoxidizing bath and another rinse. The same conveyor takes the cleaned parts to the welding machines and conveys the welded cans through the various finishing operations required.

As with any aluminum welding job, it is necessary to clean and deoxidize the material in preparation for delivery to the welders. At Conco this is done by means of an overhead conveyor system passing through a series of tanks and spray rinses. In the first tank, a buffered alkali solution is used for removing shop dirt, oil and drawing compounds from the component parts. The P*h* in this tank is carefully controlled to a 12.0 reading. The time of immersion is two minutes, and the temperature is maintained at 180 F.

After leaving the alkali tank, the parts pass through a powerful clear-water spray rinse. This step is very important to successful cleaning. The spray water used is the waste cooling water from the resistance-welding machines; it is pumped to spray nozzles to give a very strong spray. Parts then pass into the deoxidizing tank, which contains a phosphoric-acid type of material held at a concentration of 5 to 1. The time of immersion in this tank is two minutes, and the temperature is maintained at 115 F. The concentration in the deoxidizing tank is carefully controlled by titration and surface-resistance measurement of the cleaned aluminum parts by means of a very sensitive Wheatstone bridge.

Fig. 7—The final assembly operation is to seam weld the bottom flange

From the deoxidizing bath, the parts pass through another powerful clear-water spray rinse and are then carried without further handling by the conveyor directly to the welding machines. The parts are still wet upon their arrival at the welding machines, and this seems to be of some advantage in maintaining consistently good weldability.

The most important factor in cleaning for welding is to reduce the contact resistance to a uniformly low value. Tests show the aluminum as received had a contact resistance of between 130 and 150 microhms. Parts cleaned by the Conco method had a resistance of 6 to 10 microhms as compared with wire brushing, which checks about 11 microhms. Reoxidation occurs after cleaning, and it was found that parts cleaned and allowed to stand over night would go back up to 80 to 90 microhms and would not return to the low value upon recleaning. Therefore, we clean only enough parts to supply the welders so that parts can be welded as soon after cleaning as possible.

Starting the Assembly

The first assembly operation is to tack weld the body. This is done on a spot welder as shown in Fig. 2. The conveyor then moves the can to one of the longitudinal seam welders to weld the vertical pressure-tight seam (Fig. 3). While the body is being welded, another spot welder joins the handle to the top of the can (Fig. 4).

The welded body is now placed on a jig, and the top or head is located with a hydraulic fixture and clamped in place while eight tack welds are being made on the flange as shown in Fig. 5. The clamps are then removed, and the tacked assembly is seam welded on a circular seam welder (Fig. 6). This seam is then rolled down on a special automatic machine of Conco design.

At this stage, the top seam is required to pass a 12-psi air-pressure test. In view of the fact that the can still has an open bottom, such a test might seem difficult to administer, but a way to make it was found by clamping the bottom to the assembly and against a rubber pad. Should the top seam show leakage, it is a relatively simple manner to reweld the open can.

If there is no leakage in the seam, the bottom of the can is put in a locating fixture and tacked in place. The bottom flange is then circular seam welded (Fig. 7) and rolled over in the same manner as the top seam. With welding completed, the can is submerged in water for its second leakage tests.

The conveyor system continues to carry the cans through their final finishing, which includes an acid rinse, sterilizing and painting.

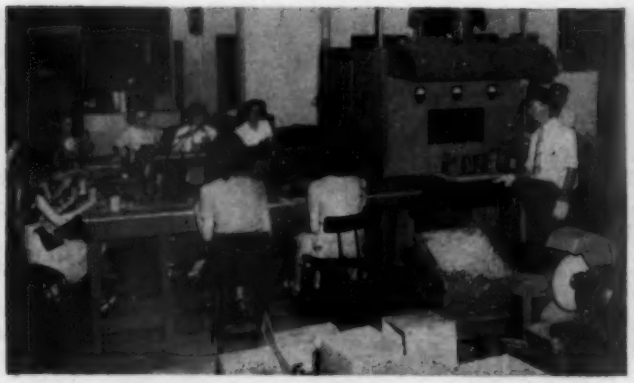


Fig. 1—This production line can turn out 100 six-piece sets of stainless-steel kitchen utensils per hour

Fig. 2—The shank and blade of the utensil are joined in approximately 12 seconds by induction heating

Induction-Brazed Kitchen Tools

BY L. GISE and J. R. STEWART
Westinghouse Electric Corp., Philadelphia

A 20-kw, 450-kc radio-frequency generator has made possible a speedy and efficient production line for the silver brazing of stainless-steel kitchen utensils at the Adel Precision Products Corp., Huntington, West Va. This concern manufactures a set of six utensils—two forks, two spoons, a cake turner and a spatula—all made of stainless steel and topped with plastic handles.

Applied to the brazing of stainless-steel kitchen utensils, induction heating has increased production, reduced labor costs and improved quality.

Use Inexperienced Workers

Ten women and two men form the production line (Fig. 1). Inexperienced personnel were found to be no drawback to the efficient operation of the induction-heating unit, and consequently the company was able to release skilled workmen for important jobs on other production lines.

The shanks are formed in another part of the plant, inspected at the start of the finishing table and placed in a frame. As they pass from one operator to another, a slotted ferrule is placed on one end of each shank, and a wire ring of silver-brazing alloy is inserted at the interior joint of ferrule and shank. A small amount of flux is added at the point where solder and ferrule meet the shank.

The coil used to join the ferrule and shank is a multiple of twelve single turns in series. Heating is carried out for 15 seconds at 1,250 F. The brazed assemblies are removed from the frame, rinsed in an alkali cleansing bath and sent to another factory where the plastic handles are pressure fitted to them.

Upon return to Adel Products, the shanks are placed in another frame for assembly with their blades. Flux is painted along the line of juncture of each unit, and a narrow strip of silver-brazing alloy is placed on the back of the blade. Flux is also painted on the beveled end of the shank before the frames are locked.

The next heating process (Fig. 2) uses a unit of four coils in series, each coil being approximately three quarters of a turn. A heating cycle of 12 seconds is all that is necessary to seal the joints. The finished utensils are released from the frame and rinsed in a hot alkali cleaning solution—the same solution as that used in the preparation of the shank and ferrule for the plastic handle. Finally, the tools are polished by holding them against a motor-driven polishing wheel.

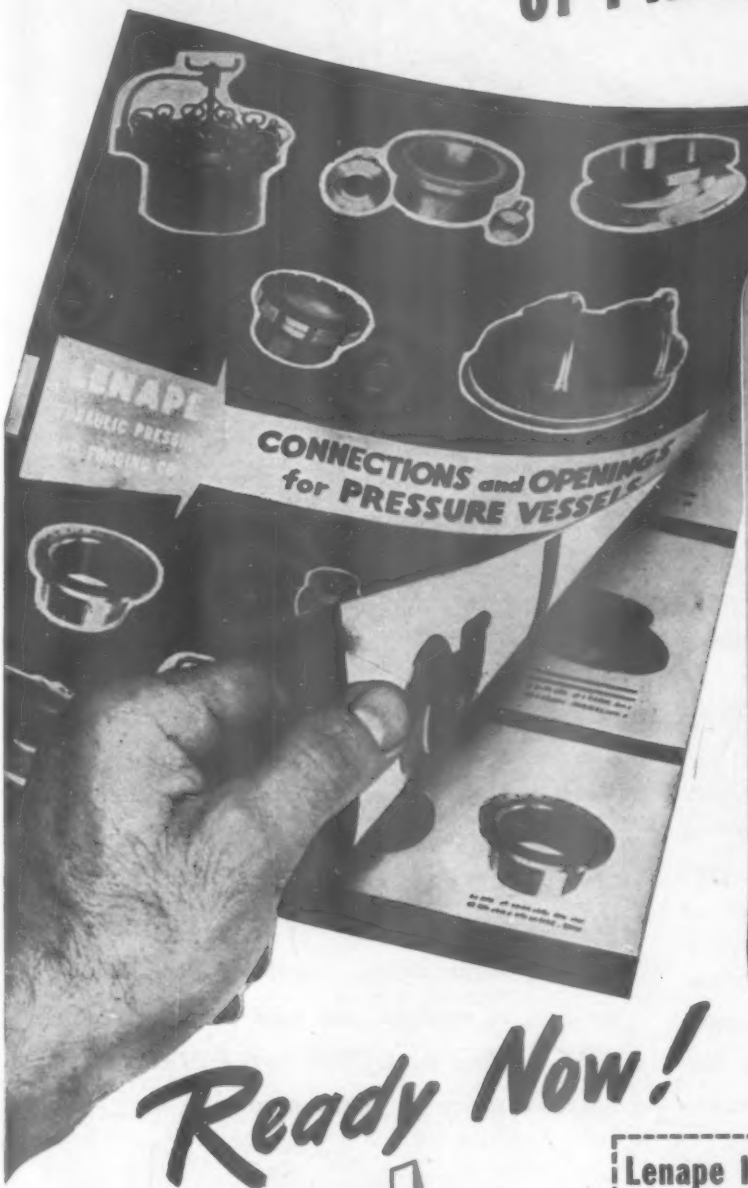
Costs and Savings

The initial investment, including the r-f generator, work coils and production line, was about $10,000. Operating costs amount to approximately $10.80 per hour—$10 for labor and 80¢ per hour for the generator. The 80¢ includes power at the rate of 1¢ per kwh, tube replacements (based upon 5,000 hours average life) and amortization of the generator over an operating life of 30,000 hours.

Since production totals 1,500 sets of six utensils per 15-hr day, the actual operating cost is 10.8¢ per set or $162 per day. Hand soldering, it is estimated, would require 20 skilled men at a total daily labor cost of $390 to accomplish the same production. The saving of $228 per day pays for the initial investment in two months.

The r-f generator ordered for this job is a standard 20-kw, 450-kc set. Power input for full generator output is 43 kva, 3 phase, 60 cycle, at 95% power factor. Control is by means of a start-stop button mounted on the face of the cabinet, and an automatic timer de-energizes the unit after the preset time-heat cycle has elapsed.

HELP FOR DESIGNERS and FABRICATORS of PRESSURE VESSELS



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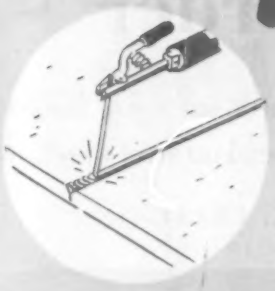

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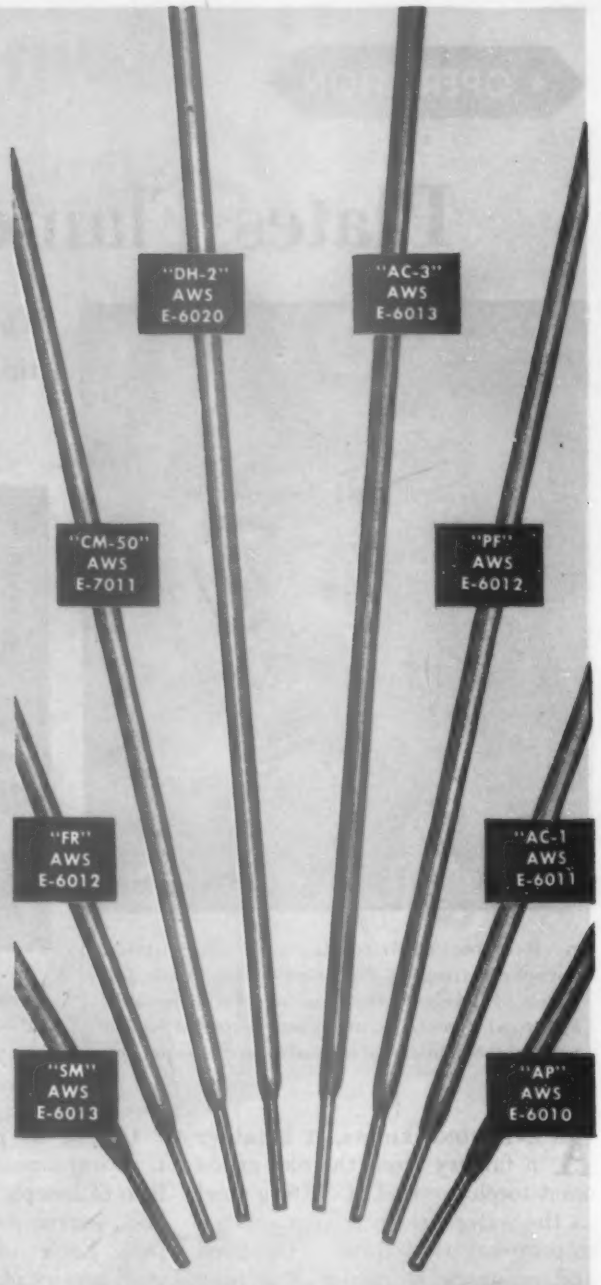

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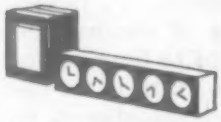


WELDING PRODUCTION CONTROL SYSTEMS

ELECTRIC HOISTS

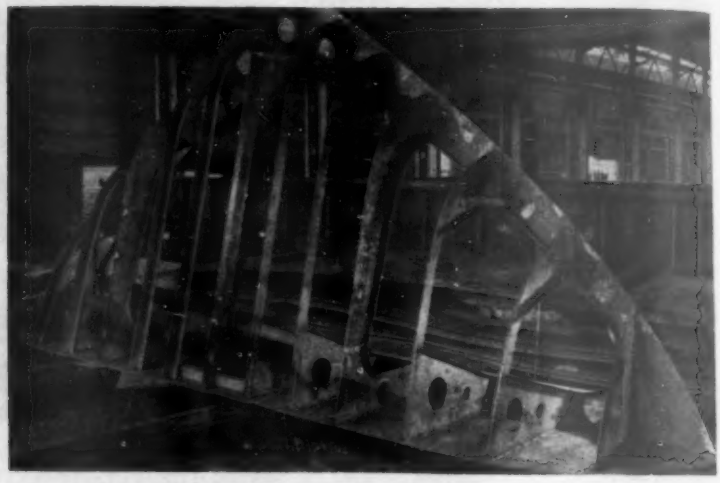
★ OPERATION

Plates Flame-Cut to Order

The welding shop doesn't need its own flame-cutting machines when it can depend on steel warehouses.

BY WALTER K. CREAL

A Ryerson multitorch machine cutting sprockets from ½-in. steel plate. This job involved flame-cutting of several thousand identical sprockets, not a single one of which was rejected because of faulty workmanship



Fabricated in a welding shop for a ship-building company, this all-welded unit is a cant section for the stern end of a frigate. It was built almost completely of flame-cut steel plates

AS EVERYONE knows, it is rather a far cry from the old, crude hand-torch method of cutting steel to the automatic precision set-ups in common use today. The speed and accuracy of modern machine flame-cutting didn't just happen but were created because a demand existed for them. Much of the credit for the current widespread use of flame-cut steel parts should go, the writer believes, to the steel warehouses, for they were the first to popularize flame-cutting services among all classes of steel consumers.

Today parts cleanly and accurately flame-cut from steel plates are extensively employed in the production of machine bases, locomotive and car frames . . . in various other forms of construction ranging from ships to farm equipment. Let's give a little of the applause for the accomplishment to the progressive steel warehouse.

One of the pioneers in this field, the warehouse steel distributing firm of Joseph T. Ryerson and Son, Inc., serves as an excellent example. Each of Ryerson's eleven steel-service plants is equipped with manual and automatic flame-cutting equipment. In Chicago (a typical set-up), the Ryerson flame-cutting division occupies a sizable portion of one of the plant buildings and comprises facilities for both individual jobs and production work. The firm's engineering division supervises cutting operations and coöperates with customers on problems of design and fabrication.

Where a large number of identical pieces are to be cut, multitorch machines are used. Torches can be hooked up in tandem to follow a master pattern or template, greatly speeding the cutting of both plain and intricate shapes. Multiple cuts of the same shape are all uniform. Almost any irregular shape can be cut, in any thickness of steel up to the heaviest rolled. High-carbon, alloy and stainless steel are handled as readily as mild-steel plates.

Though each new cutting job is tailor-made to customer specifications, the cost of the specialized service is low when expressed in terms of the finished product. Readers of this publication are aware that welded units of flame-cut steel sections are in many cases considerably less expensive to produce than castings, forgings or stampings. In particular is this true of special machinery and equipment that is either built to order or made in limited quantities.

There is today an unusual opportunity for the welding industry to fabricate equipment made of parts flame-cut from rolled steel plates. The steel warehouse stands willing and able to lend the welding shop a helping hand.

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it's no longer necessary to destroy the weldment. Radiography provides visual evidence of the internal condition of the weld . . . makes it possible to determine more positively whether the weld is sound . . . often saves enough thereby to pay for the radiographs many times over.

ere's another . . .

IN IMPROVING THE TECHNIC OF WELDING:

radiography is virtually a must. Using x-rays at regular intervals, you can show each welder the quality of his work and keep complete track of his progress . . . thus know that his work is thorough and efficient on the job at hand. Think of it!

nd another . . .

IN CREATING ACCEPTANCE FOR WELDING:

put yourself in the buyer's chair. You'd buy more welded parts, wouldn't you, if you could see *proof* of their soundness? That is precisely why radiography can help you increase the use of welding so much you'll be happy to pay the cost of the x-rays.

For more information about radiography to fit your particular needs, call in your local x-ray dealer or write . . .

EASTMAN KODAK COMPANY · X-ray Division · ROCHESTER 4, N. Y.

Radiography . . . another important function of photography

Kodak

Welded Steam Jet Ejectors

BY FRED D. BOSTWICK AND WAYNE CLAFLIN

Process Industry Engineer and Welding Engineer, respectively, Ampco Metal, Inc., Milwaukee

THERE are many reasons for operating chemical processing equipment at vacuum. Some of them will at once occur to the reader. The boiling point of a liquid can be lowered by lowering the working pressure. Various substances can be distilled or concentrated with very little decomposition through this method. Then, too, evaporation can be accomplished several times more rapidly, so that the capacities of the evaporating equipment are more than doubled.

Steam Jet Ejector Systems

Steam jet ejectors, in conjunction with intercondensers, barometric and surface condensers, are frequently more efficient than various types of vacuum pumps. A small steam jet ejector when used to supplement the condensers prevents the development of back pressures and assures smooth vacuum operation. The more common applications of steam jet ejector systems are in processes requiring crystallization, dehydration, deodorization, distillation and evaporation.

Useful as these devices are to chemical processing industries, their adaptability and efficiency are constantly being improved. Superior corrosion-resistant alloys plus better welding methods and electrodes have greatly assisted the development of modern steam jet ejectors. Corrosion is, probably, the biggest problem confronting designers and manufacturers of chemical processing equipment. To meet it, prealloyed aluminum bronze in plate form is being combined with aluminum-bronze centrifugal castings to produce weld-fabricated steam jet ejectors that can stand up under tough service.

Fig. 2 — End sections and completed assemblies. These venturi tubes will be used in the processing of soap and fatty acids

Welded Venturis

Evidence of the trend to welded aluminum-bronze products is furnished by the accompanying two pictures. These venturi tubes were made for jet ejectors to be used by a large soap manufacturer. They were fabricated from aluminum-bronze rolled plate and centrifugally cast flanges and welded with aluminum-bronze rods and electrodes.

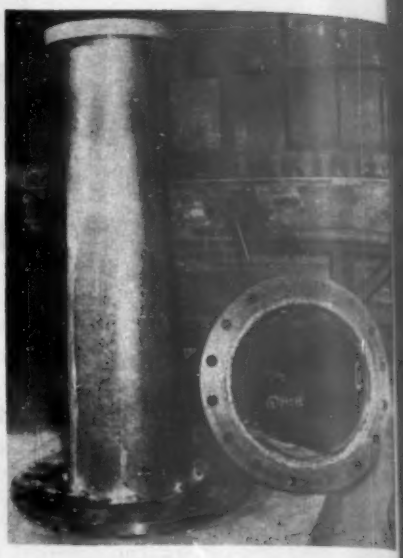
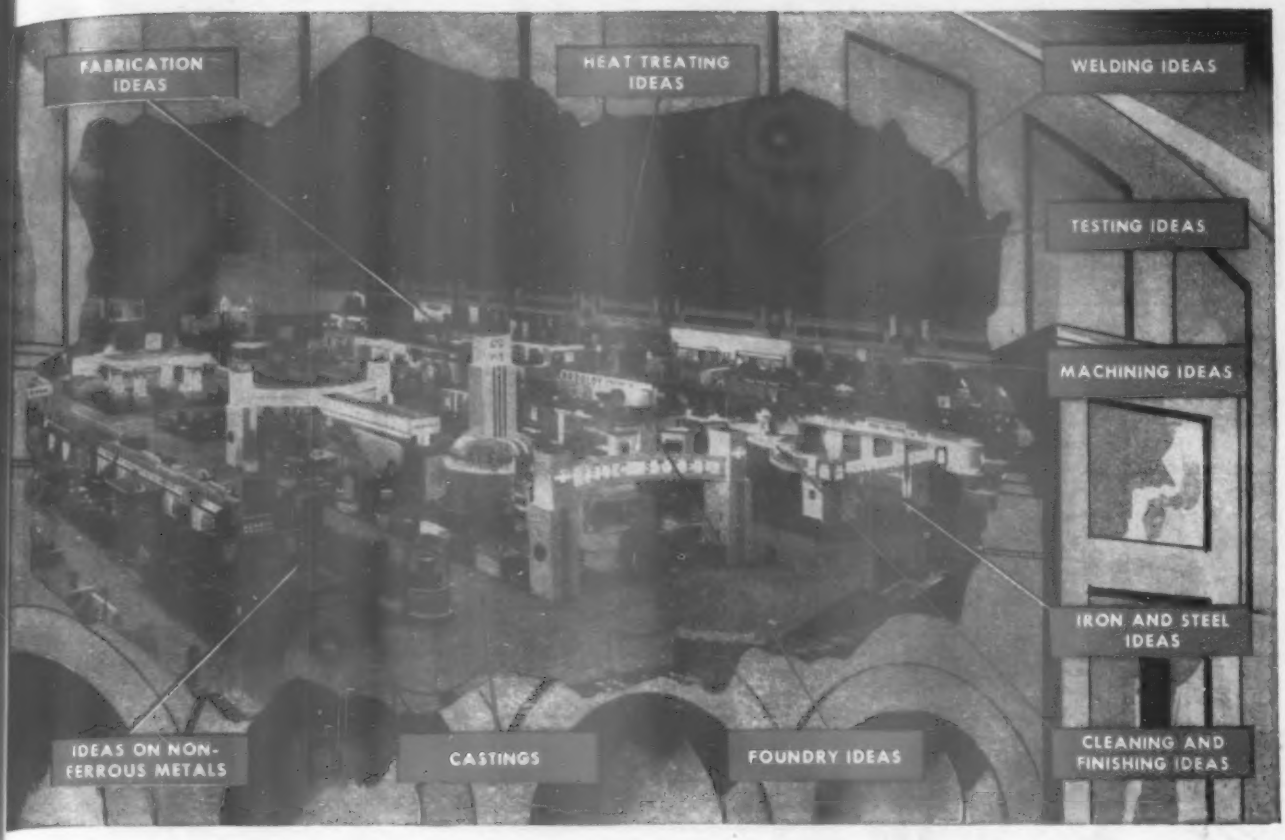


Fig. 1—Section of a venturi tube tack welded to a flange and ready to receive its final fillet weld. The section on the right shows a completed weld from the opposite side

First step in the manufacture of a venturi section was to cut the ¼-in. plate to size and roll it to the proper shape. A ⅛-in. opening was left between the edges of the frustrated cone thus formed, and a copper back-up strip was placed on the inside of the tube. The longitudinal seam was then welded with 5/32-in. electrodes of AWS specification E-Cu-Al-A, using the metal-arc process, reverse polarity.

The flange was prepared for welding by beveling a 45-deg angle approximately ¼-in. deep on each side of the inner circumference. It was then tacked to the tube and fillet welded, using the carbon-arc process, straight polarity, with 3/16-in. filler rods.

Fig. 1 shows a section of a venturi tube tack welded to a flange and ready to receive its final groove weld, and Fig. 2 shows the completed sections. This assembly is used in the processing of soap and fatty acid by-products, in conjunction with a fabricated aluminum-bronze booster and barometric condensers constituting a three-stage system. Aluminum-bronze plate, castings and electrodes were selected as the most suitable alloy to resist the corrosive action of fatty acids, esters and other organic materials.



FIND THESE *PRODUCTION* IDEAS AT THE METAL SHOW

MUNICIPAL AUDITORIUM, ATLANTIC CITY, NOVEMBER 18-22

We're taking the lid off to give you a glimpse of what awaits you at the big National Metal Congress and Exposition, Atlantic City Municipal Auditorium, November 18 - 22.

More than 300 of the nation's leading manufacturers are concentrating their latest equipment and processes — many in actual operation — in the vast Auditorium and Exhibit Hall. Here will be your convenient opportunity to see exhibits featuring metals and equipment and processes for their welding, forming, casting, cutting, machining, heat treating, cleaning, plating, testing and inspection.

Here you will hear the production ideas developed by other outstanding metal experts from all the United States and Canada. During daily sessions of the Metal Congress sponsored by four great national societies, you may discuss research papers developed by hundreds of outstanding authorities. More than 100 technical and practical papers will be presented, covering all phases of metal industry operations.

Spend all or part of the week of November 18 — to your own very good advantage — in Atlantic City. Find the production ideas you need at this big 28th Congress and Exposition. You may secure hotel accommodations by wiring the Housing Bureau, 16 Central Pier, Atlantic City.

NATIONAL METAL CONGRESS AND EXPOSITION

Sponsored by the American Society for Metals in cooperation with

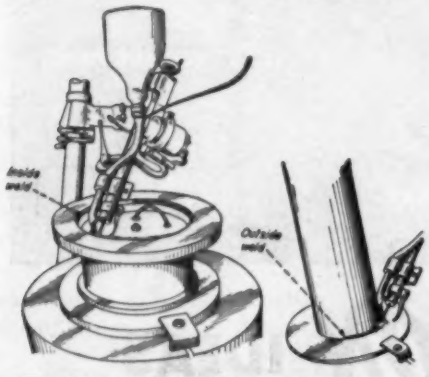
The American Welding Society . . . The Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers . . . American Industrial Radium and X-Ray Society.

Short Cuts and Kinks

Flange Welding Machine

By Fred J. Crayton

PIPE FLANGES are usually arc welded manually to large-diameter pipes. This is rather a slow process, though, and it was proving to be quite costly at Marinship, Sausalito, Calif., when I devised a method



This fixture holds a large-diameter pipe and flange and rotates them under a submerged-melt welding head. The disc holding the flange is inclined to the table at an angle

involving the use of submerged-melt welding. My suggestion included a special fixture to hold the pipe and flanges so that they would rotate under the submerged-melt head.

The idea, immediately adopted by the War Production Drive Committee, speeded up flange welding considerably. For example, it used to take us 45 minutes to weld a flange to a 12-in. pipe; this work can be done in 10 minutes on the fixture I suggested. Furthermore, the task was so simplified that even a comparatively inexperienced person could do the job.

The fixture I proposed (see sketch) consists of a supporting table with a rotatable disc. The disc is mounted on the table at an inclined angle, and rotated at a uniform speed by a motor and gear-reduction drive placed beneath the table. The flange is held on this disc by means of a dog. The pipe is then placed in the flange, and the submerged-melt head adjusted so as to form a fillet weld while the disc is being rotated.

☆ ☆

Soldering Jig

A FIXTURE incorporating two carbon electrodes mounted in a Micarta panel has aided in the soldering of small parts at the Mansfield, O., plant of Westinghouse. The electrodes are mounted at an angle so that they can be bridged by small parts such as the copper strap terminal shown in the picture. A rheostat mounted under the bench regulates the amount of current used. When the terminal has been heated to the proper soldering temperature, the solder is applied.

Do you know of a better way to do it—a way that is faster, easier or more economical than the method usually followed? If you do, why not pass it along? Send anything you think suitable for this section to: Short Cuts and Kinks, The Welding Engineer, 520 North Michigan Ave., Chicago 11. Payment will be made at our usual rates.

Two carbon electrodes mounted at an angle on a Micarta panel facilitate the soldering of such parts as this copper strap terminal

☆ ☆

Welding Aids Flame-Cutting

THE picture at top of the right column was taken at the Service Welding Co. shop in Ridgefield, N. J., and shows an interesting method of preventing distortion during a multiple-torch cutting operation. As the four torches of the shape-cutting machine made their cuts in the outer edge of the ½-in. steel plate, an arc weldor followed to tack weld the points of entry with an AWS E-6020 electrode. The tacks restored the steel to a single continuous strip, precluding the possibility of walking or lifting.

Courtesy, Air Reduction Sales Co.

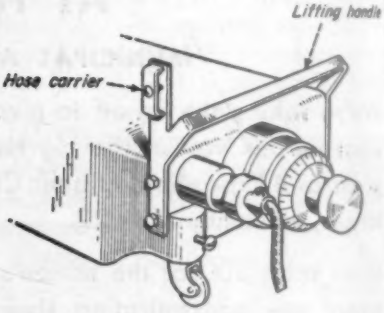
The weldor tacks down the outer edge at the points of entry, thus keeping the plate from lifting as the torches make their cuts

☆ ☆

Handle for Cutting Machine

By William D. Barber

MANY flame-cutting operators use the speed-control rheostat knob as a lifting and carrying handle to move a flame-cutting machine from one job to another. This imposes the entire weight of the heavy unit on the rheostat shaft and also disturbs the speed



It is better to use a handle to lift a flame-cutting machine than the speed-control knob

setting of the control. The natural result is to bend the shaft or otherwise damage the control. In addition, time must be taken to readjust the torch travel speed whenever a new job is started. There was actually a flame-cutting machine shortage at Richmond Shipyard No. 1 because so many machines were in the shop awaiting the repair of faulty or damaged controls.

I suggested that each machine be fitted with a simple carrying handle—an idea immediately accepted by the War Production Drive Committee. The handle was permanently affixed to the machine as shown in the accompanying sketch. The cost of the handle was estimated at $1 each, and it resulted in savings of hundreds of dollars through the reduced service requirements of the many flame-cutting machines used in our shipyard.

Electrodes, Wires, Fluxes

for welding MONEL · NICKEL · INCONEL

MONEL

Oxy-Acetylene	"40" Monel Gas Welding Wire	For welding Monel, using INCO "1" Gas Welding and Brazing Flux
Oxy-Acetylene	"43" Monel Gas Welding Wire	For welding heavy sections of Monel for acid pickling service — no flux required
Metal-Arc	"130X" Monel Welding Electrode D.C.	For welding Monel; and Monel or Nickel to steel
Submerged Melt.	"50" Monel Wire	For welding Monel

NICKEL

Oxy-Acetylene	"41" Nickel Gas Welding Wire	For welding of pure Nickel — no flux required
Metal-Arc	"131" Nickel Welding Electrode D.C.	For welding pure Nickel
Submerged Melt.	"51" Nickel Wire	For welding pure Nickel

INCONEL

Oxy-Acetylene	"42" Inconel Gas Welding Wire	For welding Inconel, using INCO "2" Gas Welding Flux
Metal-Arc	"132" Inconel Welding Electrode A.C.-D.C.	For welding Inconel; and Inconel to steel
Submerged Melt.	"52" Inconel Wire	For welding Inconel

70/30 COPPER-NICKEL

Oxy-Acetylene	"47" 70/30 Copper-Nickel Gas Welding Wire	For welding 70/30 Copper-Nickel using INCO "1" Gas Welding and Brazing Flux
Metal-Arc	"137" 70/30 Copper-Nickel Welding Electrode D.C.	For welding 70/30 Copper-Nickel
Submerged Melt.	"57" 70/30 Copper-Nickel Wire	For welding 70/30 Copper-Nickel

"K" MONEL

Oxy-Acetylene	"44" "K" Monel Gas Welding Wire	For welding "K" Monel, using 2 parts INCO "2" Gas Welding Flux and 1 part Lithium Fluoride
Metal-Arc	"134" "K" Monel Welding Electrode D.C.	For welding "K" Monel

"L" NICKEL

Metal-Arc	"136" Nickel Welding Electrode D.C.	For welding "L" Nickel

LUKENS

NICKEL-CLAD STEEL

Metal-Arc	"131" Nickel Welding Electrode D.C.	For welding Nickel side only

"L" NICKEL-CLAD STEEL

Metal-Arc	"136" Nickel Welding Electrode D.C.	For welding "L" Nickel side only

MONEL-CLAD STEEL

Metal-Arc	"130X" Monel Welding Electrode D.C.	For welding Monel side only,

INCONEL-CLAD STEEL

Metal-Arc	"133" 80/20 Nickel-Chromium Welding Electrode A.C.-D.C.	For welding Inconel side only; and solid Inconel to steel

FLUXES

INCO "1" Gas Welding and Brazing Flux — For the welding and brazing of Monel and other nickel-copper alloys; copper and copper-nickel.

INCO "2" Gas Welding Flux — For the welding of all stainless steels, rustless irons, Inconel and other chromium-containing alloys.

CAST IRON WELDING

Metal-Arc	"NI-ROD" Electrode A.C.-D.C.	For machinable welds in cast iron

For additional information or assistance on use of Inco electrodes, wires and fluxes, address Technical Service, The International Nickel Co.

NICKEL INCO TRADE MARK **ALLOYS**

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N.Y.

Easy Build-Ups that last and last . . . . .

To replace substantial portions of iron or steel equipment parts that have worn away in hard service, excellent economy is obtained with Amsco Nickel-Manganese Steel Filler Bars and Shapes. This metal, like standard austenitic manganese steel shows high resistance to impacts and abrasion, and surface-hardens under cold working. When used to restore ordinary ferrous parts, the built-up portion has much greater wearing life than the parent metal. A better-than-new part is thus obtained at a much lower cost than an actual new part.

Application requires minimum time and labor. For tacking on bars and shapes, there is nothing better than Amsco Nickel-Manganese Steel Welding Rod. The nickel content of this rod or electrode prevents embrittlement of the weld under air cooling, and eliminates the need for quenching, which might change the character of the parent metal; particularly carbon steel. The weld metal deposits in a uniform flat bead without porosity, and with very little spatter or crater checks.

Typical applications are shown in the pictures.

W-4 Manganese steel crusher mantle 128" in diameter, rebuilt with Amsco Nickel-Manganese Steel Filler Bars, tacked on with Amsco Nickel-Manganese Steel Electrodes.

A variety of bars, flats and shapes are available for rebuilding worn lips and wear plates on dippers, dragline and clamshell buckets, and repairing tractor grousers, building up worn crusher jaws and parts, making and repairing bearing plates, and a multitude of other uses, all of which afford worth while savings. Worn dipper teeth can be repointed quickly and economically with Amsco Cast Repointer Bars, which are made in 31 sizes.

A-212. Rock crusher jaw before and after application of filler bars and depositing of Nickel-Manganese Steel weld-metal to restore corrugations. Cost was only a fraction of the price of a new jaw.

A-213. Three types of dipper teeth with various sizes of repointers tacked on and partially filled in to show reclamation procedure.

(Amsco Welding Products are produced and sold in Canada by Canadian Ramapo Iron Works, Inc., Niagara Falls, Ontario.)

AMSCO

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Chicago Heights, Ill.; New Castle, Del.;
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AMERICAN Brake Shoe COMPANY

Airplanes to Wagons

By Frank W. Childs

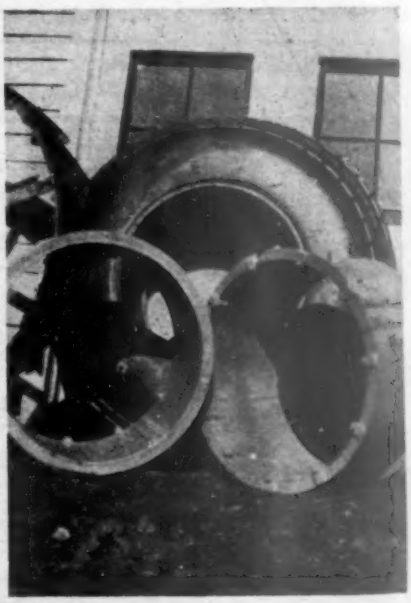
BEFORE the war I started the manufacture of all-steel, rubber-tired farm wagons, and this turned into a very profitable business. In addition to building farm wagons, we converted thousands of steel wheels to rubber-tired wheels for all types of farm machinery.

When the government began to release airplane bomber tires, we bought quite a few of them with the idea that they might fit into our farm equipment program. Though we had no trouble reselling these tires, the matter of adaptable rims did present something of a problem. The government released only the tires, and aircraft rims would not have been satisfactory anyhow. So we proceeded to build welded rims that would permit the big bomber tires to be adapted to commercial use.

This bomber tire and rim business turned into a good thing, and it was a good buy for the customer, too, as he got an 18-ply tire changeover at less than half the cost of the standard rim and standard 4 or 6 ply tire. We have installed as many as six in one week.

We have shipped these tires and rims all over the United States for use on all types of equipment including farm machinery, oil field equipment, logging equipment and all types of contracting equipment. The tires are very plentiful, and they are as good as new for civilian purposes as most of them were used for only a few landings.

I started in the garage business over 22 years ago, and just 17 years ago I purchased my first welding outfit. It was an oxy-acetylene outfit, and I spent several hours a day welding and repairing cast-iron parts. Today our welding equipment consists of three arc welders, two oxy-acetylene outfits and a spot welder.



Courtesy, The Hobart Bros. Co.

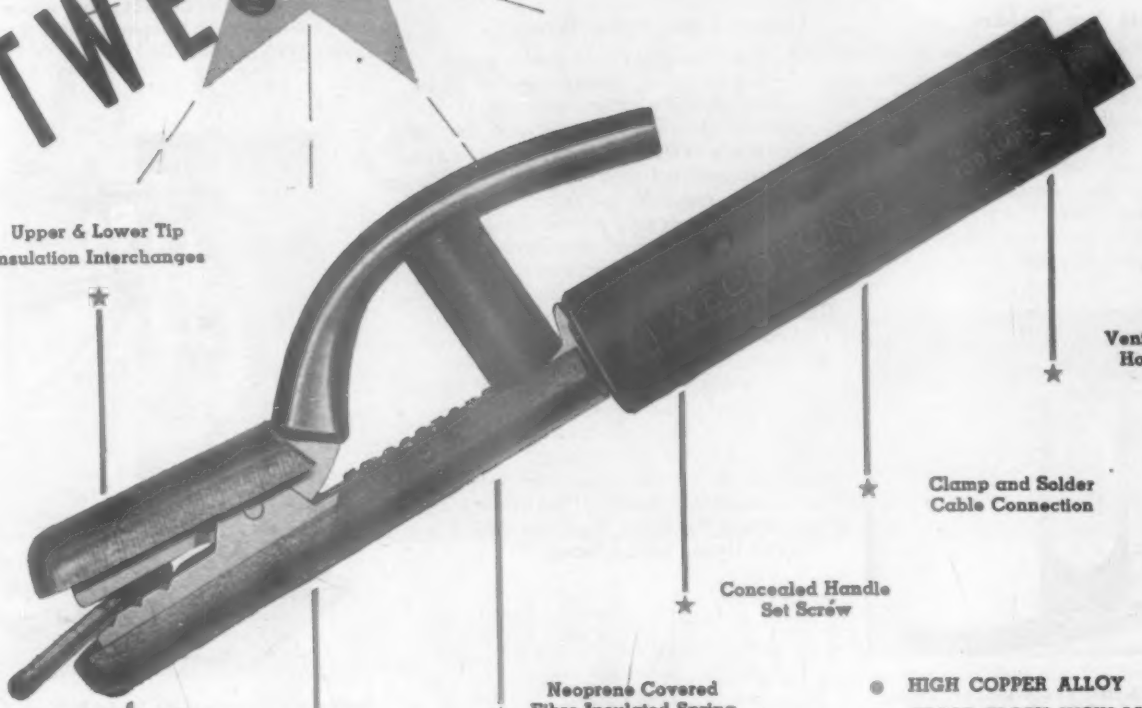
These welded rims allow government-released bomber tires to be used to replace old tractor wheels like the one on the left

STAR PERFORMANCE

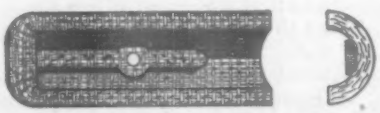
With TWECOTONG **A New Favorite**

No. A-14	No. A-38
300 Amps.—¼" Rod	500 Amps.—⅜" Rod
$5.00	$6.00

Less in Quantity


Upper & Lower Tip Insulation Interchanges
Ventilated Handle
Clamp and Solder Cable Connection
Concealed Handle Set Screw
Neoprene Covered Fibre Insulated Spring
Insulation Screws Deeply Countersunk
Tubular Internally "Keyed" Insulation

- HIGH COPPER ALLOY
- GLASS CLOTH INSULATED
- ALL PARTS REPLACEABLE
- SAFETY ENGINEERED



TWECOTONG insulation is exclusive in design and material. "Tubular-Keyed" construction with deep-set boss snugly locates each piece on the holder casting. Glass Cloth (laminated) Bakelite insulators withstand great impact, heat and arc burn. This combination assures maximum holder service with a minimum of main enance. TWECOTONG is covered by U. S. Letters Patent No. 2,401,523.

LAUGHS AT IMPACT!! HEAT!!

"PROOF OF THE PUDDING"

You wouldn't do these things intentionally . . . but as tests—TWECOTONG CAN TAKE IT.

TWECO PRODUCTS COMPANY, WICHITA 1, KANSAS

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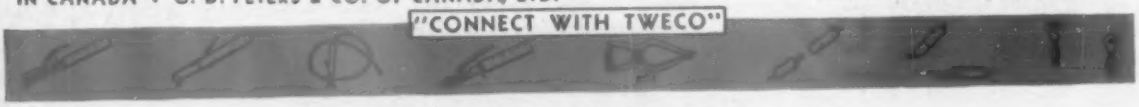
"CONNECT WITH TWECO"



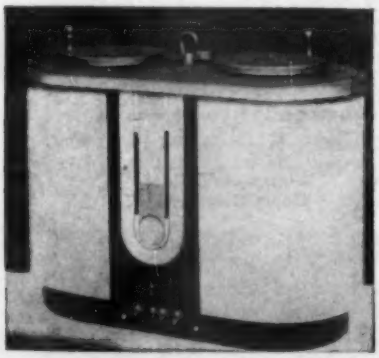
EXPORT: HENRY R. JAHN & SON, 7 Water St., N. Y. 4, N. Y.

New Products to Use

To Secure Additional Information, Turn to Page 89

Two-Unit A-c Welder

1 A NEW twin-unit, outdoor a-c welder in a single enclosure can be used simultaneously or independently with electrodes up to 3/16 in., or the two units can be combined into one circuit for heavy-duty welding with 3/8-in. electrodes. The units have a current range of from 90 to 270 amp when used independently and from 180 to 540 amp when operated in parallel.



General Electric's twin-unit arc welder

Both welders are equipped with a control which reduces the open-circuit voltage to about 30 volts when the machine is not welding but makes full power available the instant the arc is struck. The two circuits are supplied through a single set of primary terminals; hence only one power-line circuit is required. The machine is completely covered and protected from all kinds of bad weather. ELECTRIC WELDING DIVISION, GENERAL ELECTRIC CO., Schenectady 5.

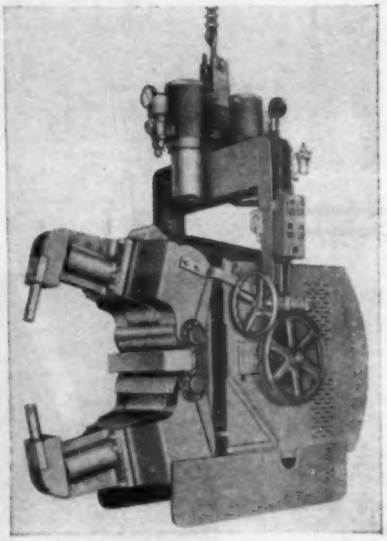
* *

Vacu-Blaster

2 AMONG its other uses, the new "Vacu-Blaster" may be employed to clean the edges of steel plates in preparation for welding. This device consists of a blasting gun, abrasive reclaimer, dust collector, abrasive storage tank and vacuum pump. While the surface to be cleaned is bombarded by steel grit from the blasting nozzle, the refuse and spent grit are automatically picked up and returned to the abrasive reclaimer for separation. The gun is light enough to be operated with one hand, and a push button controls the entire operating cycle. THE VACU-BLASTER CO., San Francisco 5.

Heavy-Duty Spot Welder

3 A NEW giant spot welder is able to weld three thicknesses of 1/2-in. structural steel without removing the rust and scale that are usually present on this material. Welding through rust and scale is accomplished by a special electronically-controlled sequence which provides: (1) a preweld period of high pressure and low current that burns off surface oxides; (2) a high-current welding period during which electrode pressure is reduced; and (3) a postweld period in which current is interrupted under high pressure for a final forging action. When welding high and medium carbon steels (above 0.20%), a special postheat period is provided which eliminates hardening. Speeds range from 2 to 25 spots per minute, depending upon the thickness and degree of scale. Peak power for maximum thickness is about 500 kva. SCIAKY BROS., INC., Chicago 38.



Spot welder for welding structural steel 1/2-in. thick and scaly materials

* *

Welding Fittings

4 THIS complete line of stainless-steel welding fittings includes 180-deg long radius returns, 90-deg long radius elbows, 45-deg long radius elbows, straight tees, reducing outlet tees, caps, eccentric reducers, concentric reducers, lap-joint stub ends, laterals and crosses, all in standard and extra-heavy weights. Welding neck flanges, slip-on flanges, threaded flanges, blind flanges, socket-type welding flanges, orifice flanges and lap-joint flanges are available in sizes ranging from 3/4 to 12 in.

Fittings may be had in three grades of stainless steel: type 304, an 18-8 steel; type 347, containing 18% chromium, 8% nickel and about 1% columbium; and type 316, containing 18% chromium, 8% nickel and 2% molybdenum. Outstanding features include: resistance to atmospheric corrosion, acids, chemicals and scaling at high temperature as well as strength and ductility at sub-zero and elevated temperatures. TUBE TURNS, INC., Louisville 1.

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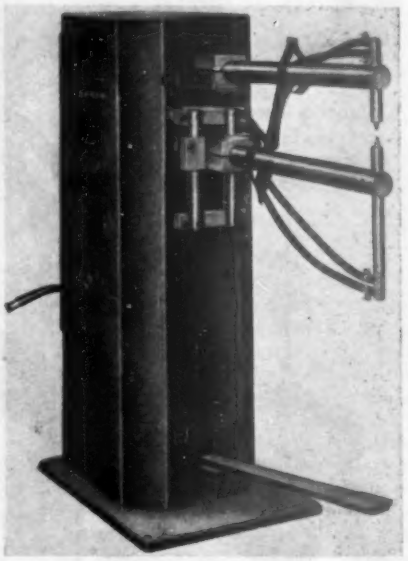


Larkin 20-kva spot welder, Model R-24, also available with a magnetic contactor

Spot Welder

5 OPTIONAL horn length and five heat controls are the features of a new 20-kva spot welder that may be used to join steel, iron, aluminum, Monel, gold, magnesium alloys, nickel, etc. This foot-operated unit (Model R-24) includes a heavy-duty, automatic circuit-breaker switch. The adjustable lower horn permits vertical movement within a range of from 5 to 15 in. to accommodate all types of work. Reversible double-end horns are available as are water-cooled horns. All holders and tips are water-cooled. This welder is also available with a magnetic contactor and precision timer. LARKIN LECTRO PRODUCTS CO., New York City 30.

* *

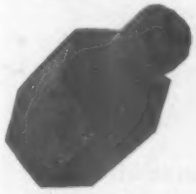
Sanding Wheel

6 REQUESTS for a small sanding head for use on fractional-horsepower motors have resulted in the development of a brush-backed sanding wheel identified as "Sand-O-Flex" model 350-B. Weighing 1 3/8 lb, this wheel has eight replaceable brushes that "cushion" the abrasive strip. Recommended speeds range from 400 to 1,750 rpm from a 1/6-hp motor or a small electric hand drill. SAND-O-FLEX CORP., Los Angeles 27.

Auto Industry Has Many Examples of "Necessities Production" Sped by Federal RESISTANCE WELDERS

ACCESSORIES

RADIO PARTS



PRODUCTION SHORT CUTS

APPLIANCES

UTENSILS

PROJECTION WELDED — Thousands of variations of the typical items above are produced at low cost on Federal Welders described in Bulletin 4520.

AMERICAN METAL PRODUCTS Company, Detroit, automatically welds spring pads to axle housings (up to 240 per hour) on this Federal Press Type Welder.

For instance, you can take a heavy-gauge steel tube like this,→ which is a rear axle housing component, and a heavy gauge stamping like this, → which is a spring pad; insert them in a Federal PA-4 Press Type Welder with simple dies (shown above) and they come out as though one piece of metal . . . but stronger. Fifteen seconds total time. That's four pieces a minute.

Note the three nubs projecting inwardly on each side of the saddle portion of the stamping. At these points of contact between stamping and tube, welds initiate. Under heat and pressure the parts are forged together in these areas, the junctures becoming stronger than surrounding parent metal.

To the vast saving of time, against previous joining methods, add time savings on final assemblies and great economy in material resulting from this design. (Heavy castings were used where lighter but tougher stampings now do the job). There you find the reasons why industries noted for making the most of needed goods at the lowest cost are largest users of Federal Resistance Welders.

This is typical of hundreds of Federal welded jobs produced by the American Metal Products Company of Detroit, makers of quality parts for many industries. It is typical too, of thousands of other production-speeding, cost cutting methods possible with Federal Resistance Welders.

Every delay of full-scale production for the dammed-up needs of world markets through shortages of material or of work makes the need for eventual production speed more important . . . lowering of unit costs more urgent. When you find out (through the Federal Engineering Service nearest you) how you can cut cost and time in YOUR production with automatic welding, be sure that you get Resistance Welders by . . . Federal

BULLETIN SP 346 Describing Federal Spot, Flash, Projection, Seam and "Gun" Welders is yours for the asking.

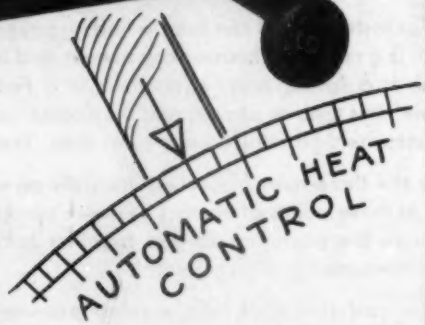
THE Federal MACHINE AND WELDER CO.

SUBSIDIARIES
Sommer and Adams Co., Cleveland—SPECIAL HIGH PRECISION MACHINES
The Warren City Mfg. Co., Warren—WARCO PRESSES and PRESS BRAKES

MEMBER AWMA

WELDING
MODERN STEELS
BY
MODERN METHODS
DEMANDS
INDUCTION HEATING

60 KVA Model BH
Induction Heater
with Full Heat
Cycle Program
Control and
6 Point Recorder



FOR PRECISION
CONTROL OF
HEAT!

INDUCTION HEATING by the SMITH DOLAN SYSTEM
Plus The New HEAT CYCLE PROGRAM CONTROL
Gives all this and more.—Precision control of PREHEATING
FOR WELDING and NORMALIZING AFTER WELDING
is the only efficient method for joining modern alloy steels.

MODERN — SELF-OPERATING — COMPLETE!

Once the metallurgical heat-cycle for the steel has been determined, it is only necessary to set the controls, and the machine shown above will deliver this program from start to finish! In addition, recorded charts keep permanent records for duplication of results. A complete unit for efficient performance. Temperatures up to 1750° F. readily obtainable.

ELECTRIC ARC, Inc.
152-158 Jelliff Ave. Newark 8, New Jersey

Headrest goggles can be flipped above the eyes to permit inspection of the work

Welding Goggle

7 DEVELOPED to eliminate waste motion and speed up welding operations is a new headrest welding goggle which can be instantly thrown into "off guard" position for inspection purposes. With one hand, the welder can flip the goggle above his eyes. It is adjustable for individual features and may be worn over prescription glasses. Ventilated side shields keep out stray light rays, sparks and metal splashes. Either "Noviweld" or "Noviweld-Didymium" lenses are available. AMERICAN OPTICAL Co., Southbridge, Mass.

* *

All-Position Electrode

8 "AIRCO No. 87," a general-purpose E-6012 mild-steel electrode, is recommended for single-pass or multiple-pass welding on plates or sections where fit-up is poor or work is rusty or dirty. Example of its application are storage tanks, steel structures, general maintenance and repair work in railroad shops, foundries, etc. It may be used with either a-c or d-c welders, straight or reverse polarity, and is said to produce a weld metal of high mechanical properties at a high deposition rate and efficiency; even less skilled operators can produce excellent results at high speeds on lighter gauge metals, manufacturer claims. AIR REDUCTION SALES Co., New York City 17.

* *

Marking Machine

9 PRODUCTION marking of flat parts has been simplified by a new bench-type marking machine constructed from a heavy grey-iron casting. This unit is capable of marking 30 to 40 parts per minute. ACROMARK Co., Elizabeth, N. J.

* *

Hydraulic Table

10 DEMANDS for a range of elevation not obtainable with standard construction has resulted in the development of a telescopic cylinder for a hydraulic elevating table with range of from 28 to 50 inches. This table is used for the handling of dies, jigs, fixtures, etc. LYON-RAYMOND CORP., Greene, N.Y.

HOW TO WORK LESS AND MAKE MORE MONEY...

in one easy lesson!

The answer is: not *what* you do, but *how* you do it.

Suppose we take as simple a thing as assembling a metal drawer. You can do it any number of ways. You can rivet, use nut and bolts or some other fastening device, or you can arc-weld (with expert operators). In any event there is a lot of manual handling of the work. Other operations—such as drilling—may be required, and the job takes time: man hours and machine hours.

Or-you can resistance-weld

At the left is a typical Progressive designed-to-the-job machine which automatically assembles a drawer every 15 seconds, making as many as 48 spot welds in each one. All the operator does is drop the parts in place, throw a couple of light toggle clamps and *push a button.*

The result?

The manufacturer keeps his costs and price down. The shop produces more. The worker can justify his high wages while actually doing less physical work.

And the product has been improved!

This is not a special case. It's happening all over the country on all kinds of products. Progressive's ability to design and build the kind of equipment that cuts your costs is what has made it the leading producer of resistance welding equipment today.

We will be glad to study your product from the standpoint of its weldability at lower unit costs.

Are you receiving the Progressive Pictorial? It will bring you regularly the latest news on resistance welding design, methods and equipment.

SEE US AT THE METALS SHOW—BOOTH No. J-220

IT PAYS TO WELD

PROGRESSIVE Welder Co. 3050 E. OUTER DRIVE • DETROIT 12

CABLE ADDRESS "PROGWELD"

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

RESISTANCE WELDING EQUIPMENT

"Sta-Safe" plastic eye mask is lightweight and may be worn over prescription glasses

Eye Mask

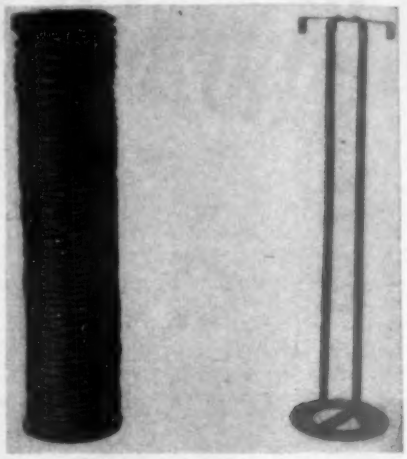
11 DESIGNED to give maximum eye-zone protection is a wide, pliable plastic lens molded to a curve for natural sight without obstruction, reflection or distortion. This non-flammable eye mask may be worn over corrective glasses and fits all average facial contours. The mask weighs 1¾ oz and is available in either clear or green-tinted lenses and frames. STANDARD SAFETY EQUIPMENT Co., Chicago 10.

* *

Automatic Battery Charger

12 A FULLY automatic motor-generator set has been developed for charging of motorized lift-truck batteries in either lead-acid or nickel types and for the modified constant-voltage charging of one 6-cell, 250-amp-hour battery in eight hours. Setting of the interval timer starts the charger and shuts it down at the end of a preset charging time; the charging rate is controlled by the modified constant-voltage generator. A reverse current cutout disconnects the battery in case of power failure and reconnects it so that charging is resumed on the return of power. MOTOR GENERATOR CORP., DIVISION OF THE HOBART BROS. Co., Troy 1, 0.

* *



"Spira-Tote" for carrying retractable tubing

Flexible Tubing Carrier

13 "SPIRA-TOTE" is the name of a combination carrier and stowage rack for handling and storing various lengths and diameters of retractable flexible tubing used for ventilation hoses, etc. Hinged extension pieces at the top of the rack turn to permit the tubing to slip onto the rack, then move out to lock it in place. The amount of retractability averages about 8 to 1; *e.g.*, a 10-ft section of 16-in. "Spiratube" is compressed to about 11 in.; a similar section of 3-in. tube to 24 in. SPIRATUBE DIVISION, THE WARNER BROTHERS CO., Bridgeport 1.

* *

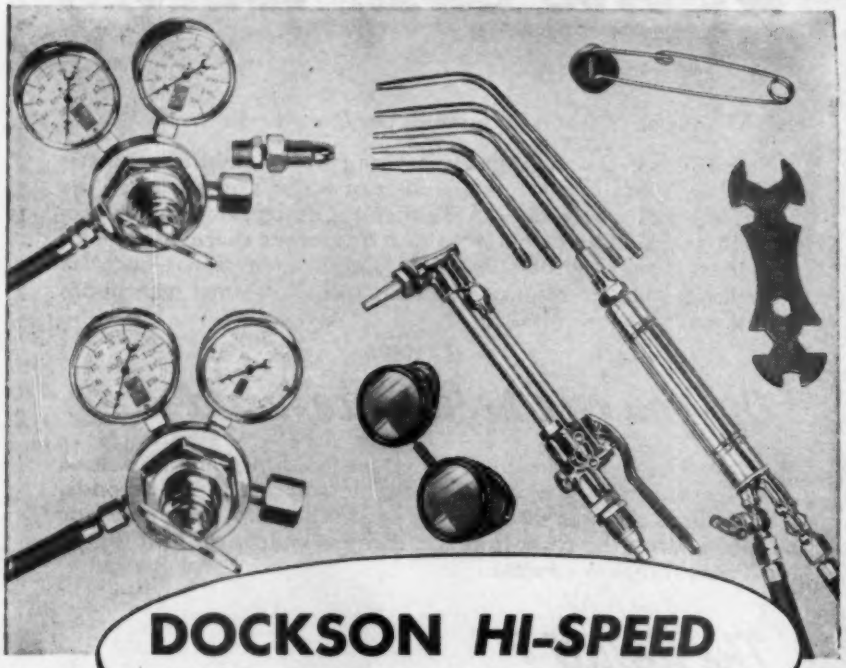
Circuit Tester

14 "HI" tester is a new pocket instrument for use on either a-c or d-c circuits to locate grounds, opens, blown fuses, motors running single phase, tracing control, etc. and to indicate approximate voltage. Equipped with a filament lamp, it gives definite signals in brightly lighted as well as in dark places. This instrument is made in ranges of 110 to 600 volts and 110 to 440 volts. HOLUB INDUSTRIES, INC., Sycamore, Ill.

* *

Low-Range Tester

15 DILLON has developed a low-range universal tester for small finished items. Capacity ranges are from 0–10 lb in 1-oz dial divisions to 0–100 lb in 8-oz divisions. Its low-grip travel varies from 0 to 19 in. per minute with ½% accuracy. Overall height is 63 in. and weight 162 lb. W. C. DILLON & Co., INC., Chicago 44.



DOCKSON *HI-SPEED*
ACETYLENE WELDING &
CUTTING EQUIPMENT

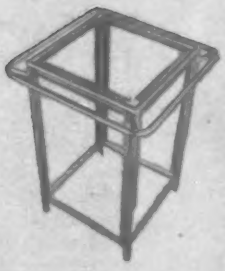
Send for our
FREE
illustrated
catalogue

● The DOCKSON No. 145 Welding and Cutting outfit shown above is typical of our complete line of Oxy-Acetylene equipment. Accurate, balanced, simple, sturdy . . . Quality built in every detail for a long life of rugged service. That is why DOCKSON equipment is standard with many of the country's finest plants. A trial will demonstrate the advantages and economies of DOCKSON equipment in your own plant.

Built for Better Service

DOCKSON CORPORATION
3839 Wabash • Detroit 8, Mich.

USE EUTECTIC *Low Temperature* WELDING RODS*



Steel table entirely welded without distortion completely eliminating costly finishing, using EutecRod 16.

THIS WELDING JOB ONLY POSSIBLE WITH EUTECTIC

Handle welded to aluminum pan with EutecRod 190. This alloy flows on aluminum like silver solder on brass—no after machining required.

THIS WELDING JOB ONLY POSSIBLE WITH EUTECTIC

Worn armature shaft overlaid with Bronzo-Chrome 185 at 1000°F without burning the insulation or distorting the shaft. Weld is highly wear resistant, but easily machinable.

THIS WELDING JOB ONLY POSSIBLE WITH EUTECTIC

Cracked cast iron cylinder head sealed with EutecRod 15, which is applied at the amazing low heat of 354°–600°F.

THIS WELDING JOB ONLY POSSIBLE WITH EUTECTIC

AVOID THESE WELDING DEFECTS caused by HIGH HEAT!

Distortion and Buckling

Stresses and Cracks

Brittle, therefore Poor Strength

Poor Machinability

Enthusiastic users call it the greatest advance in welding since the invention of the welding torch, as for the first time it is possible to obtain "true welds" without all the disadvantages of high heat.

You can save time and money on jobs and improve the quality of your work with EUTECTIC *Low Temperature* WELDING RODS* and FLUXES. You'll get strong, structurally sound, neat appearing welds that require less machining.

EUTECTIC *Low Temperature* WELDING RODS* are a new type of welding alloys which—1. *Give a true weld without fusion.* 2. *Bond to base metals well below the melting point of the base metal.* 3. *Form exceedingly strong welds through surface alloying.* 4. *Give faster, better welds at low cost.*

LET EUTECTIC *Low Temperature* WELDING RODS* SOLVE YOUR WELDING PROBLEMS. MAIL THE COUPON OR WRITE ON YOUR COMPANY LETTERHEAD FOR FULL INFORMATION.

Castolin Eutectic

EUTECTIC WELDING ALLOYS CORPORATION

ORIGINATOR OF *Low Temperature* WELDING ALLOYS*

40 WORTH STREET NEW YORK 13, N. Y.

140 Field Engineers in all principal cities of the United States and Canada to serve YOU.

*Trade Mark Reg. U.S. Pat. Off.

Please send me facts on EUTECTIC *Low Temperature* WELDING RODS* and Fluxes, and complete information on how to purchase a trial selection of 9 EutecRods for everyday use. Dept, WE-10

Name..... Position.....

Company.....

Address.....

Vane-Type Ammeters

16 Long, easy-to-read scales and reduced pointer oscillation are some of the outstanding features of a new line of d-c moving vane-type ammeters and voltmeters. Sharply defined numerals and graduations are lithographed on the color-fast metal dials, which have a scale length of 80 deg of arc on the center-zero scale and 60 degree of arc on the offcenter-zero scales. United States Gauge Division American Machine and Metals, Inc., Sellersville, Pa.

* *

Temperature Control

17 The "Xactline" temperature control, said to be the solution for costly overshoot and undershoot temperature variations prevalent in aluminum heat-treating and other heat-processing fields, provides temperature-variation control as low as ½ of a degree F. Employing millivoltmeter and potentiometer-type controlling pyrometers, Xactline can be used on all types of electric furnaces, ovens, etc. Claud S. Gordon Co., Chicago 16.

* *

Metal-Drying Machine

18 A continuous hot and cold drying machine has been developed to dry loaded racks of metal parts before or after plating or after any other type of water-solution dip. The unit works completely closed and can be connected to an exhaust blower so that all fumes can be drawn off. It can be used as a single-stage dryer or in connection with a number of successive operations, alkaline, acid or neutral. Drying time varies from 4 to 6 minutes. Optimus Equipment Co., Matawan, N.J.

* *

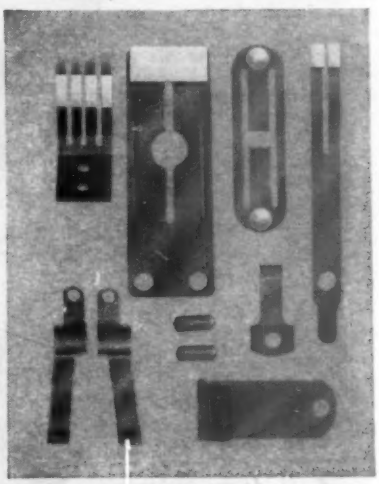
R-W Timer Contactor

19 Two new features of a non-synchronous timer-contactor for resistance welders are: narrow construction (8¼ in. wide) and the use of only two relays. Additional features include a glass cover on the door to provide dial visibility with the cover closed. The tube contactor is mounted on a swing-out panel which can be removed along with the replaceable timer panel. Brackets accommodate "B" or "C" size ignitron tubes and adapters for "A" size tubes are available. Weltronic Co., Detroit 19.

* *

Contact Springs

20 Electrical contact springs of beryllium copper are now available for use where exceptional spring properties combined with high electrical conductivity are required. Beryllium copper has a tensile strength (when developed by heat treatment) of from 175,000 to 200,000 psi. Gibson Electric Co., Pittsburgh, 21.



Beryllium-copper electrical contact springs

* *

Production Marker

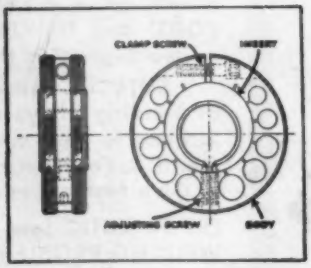
21 "E-Z Mark Etcher," a compact device for production marking, employs a film stencil to reproduce counterparts of the stencil pattern in one to three seconds on steel, brass, copper, bronze, tin and other metals. Impressions may be made by typewriter, pen, pencil or stylus. The number of reproductions from a single film can well run to several hundred, states manufacturer. The etching fluid is a non-aciduous compound, harmless to the hand or body. Ideal Industries, Inc., Sycamore, Ill.

New Thread Ring Gage Starts Round Stays Round With Every Adjustment!

Employing a new principle of design, the Woodworth Thread Ring Gage closes in round within .0002 maximum after .005 adjustment. It offers greater accuracy and stability since size adjustment is controlled along thread helix angle. Threads are held securely in alignment after adjustment, due to unique adjustment means. Wear is distributed over full circumference for all resettings, thus increasing life of gage.

Positive adjustment makes it almost impossible to change setting with ordinary knocks. Positive identification by a green "go" gage and red "not go" gage saves operator time. Aluminum alloy outer body cuts weight in half, to reduce operator fatigue and increase sensitivity.

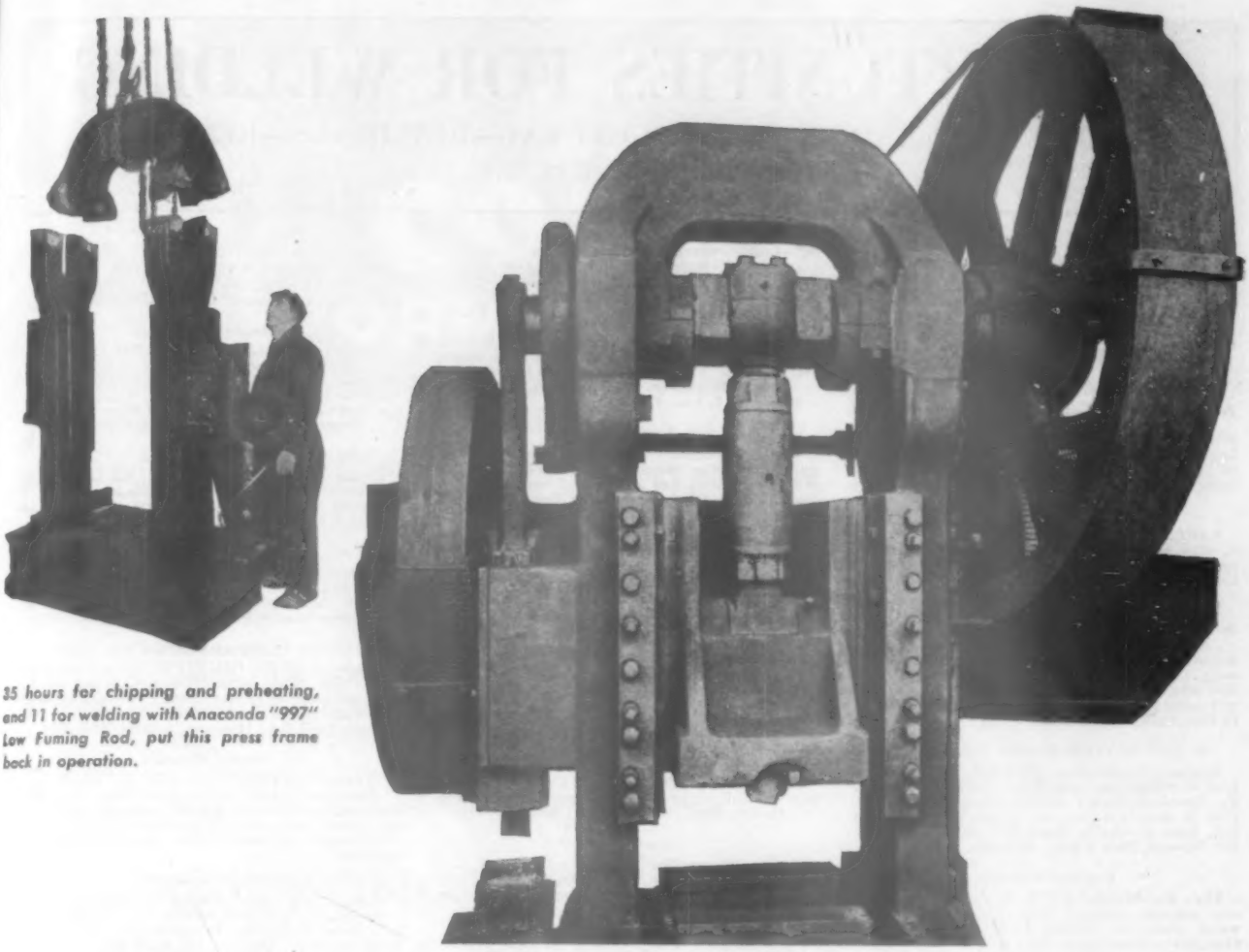
To also reduce fatigue on precision jobs, many plant owners make chewing gum available for workers. Tests show that the act of chewing aids in relieving tension, which is often the cause of fatigue. These tests further reveal that chewing Wrigley's Spearmint Gum, for instance, helps workers stay alert, thus increases their efficiency to do more accurate work.



Woodworth Thread Ring Gage

You can get complete information from
N. A. Woodworth Company
1300 East Nine Mile Road, Detroit 20, Michigan

AA-93



35 hours for chipping and preheating, and 11 for welding with Anaconda "997" Low Fuming Rod, put this press frame back in operation.

Don't wait Months for Replacement

...BRONZE WELD it in *Hours!*

EVEN on a bad break like this one, Bronze Welding can save weeks, perhaps months, of waiting . . . and in addition, the heavy cost of new replacement parts.

Bronze Welding is quick, economical, practical. You save on preheating and annealing time, and also on oxygen and acetylene.

Because of the lower temperatures employed, no serious stresses are set up, there is less possibility of warping or cracking, parts can often be welded without dismantling equipment, and intricate sections of cast or malleable iron, steel and copper alloys can be joined quickly and economically.

In addition to Tobin Bronze* and "997" Low Fuming, Anaconda Welding Rods are available in a range of compositions suitable for almost every gas or electric Bronze Welding purpose. For detailed information, write for Publication B-13, "Anaconda Welding Rods." 68196

*Reg. U. S. Pat. Off.

ANACONDA

Anaconda

BRONZE WELDING RODS

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD.
New Toronto, Ont.

OPPORTUNITIES FOR WELDING

PLATE, PIPE AND TANK—STRUCTURAL—BUILDINGS—REPAIRS AND HARD-FACING

★ Projects $500,000 and more in value.
† Federal Government Projects.

Plate Welding Pipe & Tank

Contracts Awarded

★ **Arizona and California**—GAS PIPELINE—El Paso Natural Gas Co., El Paso, Tex., 4th spread of 240 mi. 26 in. natural gas pipeline between Tucson, Ariz and Blythe, Calif., to Midwestern Constructors, Tucson, Ariz. Approx. $9,800,000.

Low Bidders

Calif., Sacramento—City, City Hall, August 9, 13,876 lin. ft. 24 in. asphalt dipped steel pipe water main, from Pacific Pipe Line Constr. Co., 2128 San Pablo, El Cerrito. $137,256.

Contracts Awarded

★ **California**—GAS PIPELINE—Pacific Pub. Service Co., 200 Bush St., San Francisco, natural gas pipeline sys. from point near Pittsburg, Co., Contra Costa to Suisun Bay, Kirby Hill and West Rio Vista gas field, Solano Co., to Pacific Pipe Line Constr. Co., 2128 San Pablo, El Cerrito. Est. $900,000.

Low Bidders

Conn., Newington—STAND PIPE—Hartford Metropolitan Dist. Water Bureau, 650 Main St., Hartford, Sept 3, steel standpipe, 70 ft. high, 27½ ft. diam. foundation and pipe pit, Mountain Rd., from S. Griffin Wise Co., 26 E. First St., Mt. Vernon, New York. $31,423.

Contract Awarded

Fla., Ft. Myers—PIPE, WATER—City, c/o city council, pipeline from city water well to water plant, to Walter Edelblut, Ft. Myers, $106,335 respectively. Bids 8/2.

Low Bidders

Ga., Valdosta—City, c/o Mayor, Aug. 28, water supply imprvs., from Stevens Southern Co., 2555 W. Beaver St., Jacksonville 4, Fla. $62,345.

Contracts Awarded

Ia., Fairfield—TANK—City, H. L. Easton, clk., WW imprvs., 500,000 gal. steel tank on tower, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines. $44,500.

Contracts Awarded

La., Jena—GAS TRANSMISSION SYS.—Town, natural gas transmission and distribution sys., to R. M. Mitchell, Box 1154, Shreveport 90. $83,975.

Contract Awarded

★ **La., Shreveport**—LOOP PIPELINE—Tennessee Gas & Transmission Co., Commerce Bldg., Houston, Tex., laying approx. 25 mi. 26 in. loop pipeline, to Morrison Bros. Constr. Co., Odessa, Tex. Approx. $1,125,000.

Contract Awarded

Louisiana—GAS PIPELINE—Magnolia Pipe Line Co., c/o Esperson Bldg., Houston, Tex., 18 mi. 5 and 6 in. natural gas pipe lines, Jennings area, to Associated Constructors & Engrs., Esperson Bldg., Houston, Tex., $70,000.

Contracts Awarded

Mass. Revere—OIL TERMINAL—Union Oil Products Co. of Boston, 15 Putnam Lane Worcester, oil terminal, bulk delivery, loading and unloading facilities, waterfront work, etc., Lee Burbank Hy. and Chelsea River to Henley-Langren Co., 60 Franklin St., Worcester. Est. $210,000.

Contracts Awarded

★ **Mich., Saginaw**—PIPE, WATER—Saginaw-Midland Water Dist., Saginaw, water supply line from Saginaw Bay to supply water sys. 1 section, to Bass Constr. & Engrg. Co., 215 Birmingham Treatre Bld., Birmingham, $507,861*** 5 sections, to L. W. Wells, Saginaw, $414,143*** 1 section, to W. J. Meagher, Bay City, $79,029. Grand total, $1,001,033.

Contract Awarded

★ **Mississippi**—GAS PIPELINE—Southern Natural Gas Co., Watts Bldg., Birmingham, Ala., 80 mi. 16 in. natural gas pipeline between Gwinville and Pickens, Jefferson Davis and Simpson Counties, to Latex Constr. Co., Oil & Gas Bldg., Houston, Tex., approx. $1,300,000.

Low Bidders

†**Montana**—TANK—Bureau Reclamation, Kalispell, Aug. 6, furnishing, erecting, testing and painting 150,000 gal. water tank, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines 8, Ia. $26,950.

Low Bidders

Ore., Portland—TANK—City, City Hall, Sept. 4, 1 m.g. elevated steel water tank, N. Willamette Blvd. and Alma St., from Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines Ia. $114,827. Est. $125,000.

Low Bidders

Pa., Cresson—TANK—Town, Dpt. Prop. Supplies, Harrisburg, steel water tank at Cresson Tubercular Sanitarium No. 2, from Pittsburgh Des Moines Steel Co., Neville Island, Pittsburgh. $39,950.

Contract Awarded

R. I., E. Providence—OIL TERMINAL—Colonial Beacon Oil Co., Dexter Rd., E. Providence, oil terminal, pipe line from wharf, to Chicago Bridge & Iron Co., 1305 W. 105 St., Chicago, Ill. $60,000.

Contract Awarded

S. C., Eau Claire—TANK—Town, WW imprvs., tank on tower, to Chicago Bridge & Iron Co., Healey Bldg., Atlanta, Ga., $28,700.

Contract Awarded

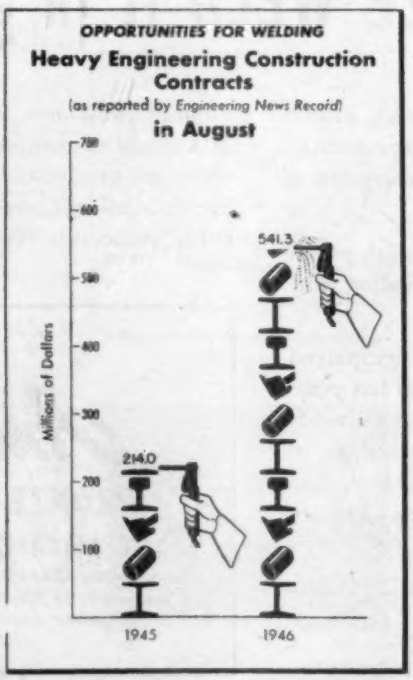
Tenn., Knoxville—PLANT—Pure Oil Co., c/o J. F. Miller, engr., 35 E. Wacker Ave., Chicago, Ill., oil storage plant, to Roehl Constr. Co., 625 Atchley Ave. $75,000.

Contract Awarded

Tex., Amarillo—TANKS—A. P. Hancock, city mgr., City Hall, 2 elevated steel tanks for WW, Tank A, to Pittsburgh-Des Moines Steel Co., Praetorian Bldg., Dallas, $115,500; and Tank B, Chicago Bridge & Iron Co., Hunt Bldg., Tulsa, Okla., $118,380. Est. $200,000.

Contract Awarded

Tex., Arp—STORAGE FACILITIES—Independent Refinery Co., Arp, constructing storage facilities, own forces. $100,000.



Contract Awarded

Tex., Dallas—NATURAL GAS MAINS—Lone Star Gas Co., 1915 Wood St., 34 mi. natural gas mains, Purchase & Hire. $235,000.

Contracts Awarded

Texas and Oklahoma—CRUDE OIL PIPELINE—Shell Pipe Line Corp., Shell Bldg., Houston, Tex. 41 mi. 10 in. crude oil pipeline reconditioning between McCamey, Tex., or Healdton, and Cushing, Okla., to Wood Engr. & Constr., Co., Cushing, Okla. Approx. $316,000.

Contract Awarded

Texas—CRUDE OIL PIPELINE CARRIER—Atlantic Pipe Line Co., Midland, 50 mi. 8 in. crude oil pipeline carrier between Crane and Midland, Purchase & Hire. $375,000.

Contract Awarded

★ **Texas**—CRUDE OIL PIPELINE—Pasotex Pipeline Co., Wink., constructing 102 mi. 10¾ in. crude oil pipeline from near Pecos to Wink, Purchase & Hire. Approx. $1,350,000.

Contract Awarded

Texas—CRUDE OIL PIPELINE—Shell Pipe Line Corp., Shell Bldg., Houston, 32 mi. 10 in. crude oil pipeline reconditioning between Haskell and Wichita Falls, to Holland Constr. Co., Old Spansih Trail Rd., Houston, approx. $165,000.

Contract Awarded

★ **Texas**—GATHERING OIL PIPELINES—Stanolind Oil & Gas Co., Gulf Bldg., Houston, constructing about 75 mi. 4- to 16-in. gathering oil piplines, Alvin area, to Associated Constructors & Engineers, Esperson Bldg., Houston, approx. $550,000.

Contract Awarded

Wis., Green Bay—BULK PLANT—Phillips Petroleum Co., 3666 S. Archer St., Chicago, Ill., bulk plant to Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago, Ill., $100,000.

Structural—Bridges and Other

Low Bidders

California—State Div. Hys., Sacramento, Aug. 28, steel, concrete bridge across Russian River at Hacienda between Guerneville and Forestville, Sonoma Co., from Kiss Crane Co., 2700 San Pablo Ave., San Pablo. $127,700.

Low Bidders

California—State Div. Hys., Sacramento, Sept. 4, steel girder bridge, grading approaches, etc. Placer and El Dorado Counties, from H. W. Ruby, Northrup Ave., Sacramento. $249,627.

Contracts Awarded

★ **Calif., Long Beach**—City, City Hall, Willow St. bridge, to Guy F. Atkinson Co., 22233 S. Santa Fe Ave., Los Angeles. $639,100.

Contracts Awarded

Calif., Oceanside—PIER—City, City Hall, 1,602 ft. pier reconstruction, to McNamara & Yount, 816 W. 5 St., Los Angeles. $139,500. Est. $175,000. Bids 8/21.

Low Bidders

Connecticut—State Hy. Comn., Hartford, Aug. 19, from D. V. Frione & Co., 87 Foxon Rd., New Haven, bridge over RR tracks, Wilbur Cross Hy., Vernon, $337,666; 2 span bridge, imprv. State St., North Haven, $125,204.

Contracts Awarded

Fla., Jacksonville—BROADCASTING STATION—Jacksonville Broadcasting Co., Gulf-Life Ins. Bldg., 300 ft. steel towers, transmitter bldg., F.M. radio broadcasting plant, to O. P. Woodcock, Florida Theatre Bldg., and The Windcharger Corp., E. 7 and Division Sts., Sioux City, Ia. $140,000.

Low Bidders

Indiana—State Hy. Comn., Indianapolis, Aug. 27, 2 bridges over Pigeon Creek, and steel beam bridge over Little Pigeon Creek, Vanderburgh Co., from Ryan Constr. Corp., 402 Court Bldg., Evansville, $139,735. est. $145,201 and $43,602, est. $48,542 respectively

It's Easier to "ROLL YOUR OWN" with the COLMONOY FORMWELD PROCESS

The ANSWER To Many TOUGH PROBLEMS

The FORMWELD PROCESS is made possible by the "plastic range" of Colmonoy No. 6.

This range starts at 1850° F. when the metal leaves the solid state and becomes plastic or mushy. It remains in this plastic or mushy state to about 2050° F. Throughout this entire range it may be formed, wiped or rolled. A typical example of the Formweld Process is shown below.

This plastic range, peculiar only to Colmonoy No. 6, is only one of the many remarkable properties of this metal.

It is highly resistant to abrasion, outlasting hardened steel in certain cases by 25 to 1. It is extremely resistant to corrosion. It is non-magnetic and non-sparking. It has high red hardness. Its co-efficient of expansion is very close to that of steel, resulting in fewer checks than found with other competitive alloys.

COLMONOY'S HIGH PLASTIC RANGE Makes Formweld Possible

The part to be hard-faced is placed between the two guide bars, which have been adjusted to the required height. It is then overlayed with Colmonoy No. 6, which is brought to its plastic range and rolled out, the excess Colmonoy being extruded over the sides. It is then reheated to the plastic range, when the excess is wiped off with a cast iron rod.

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Get full information about the complete line of Colmonoy hard-facing alloys. Typical applications are pictured. Copy on request.

WALL COLMONOY CORPORATION

7TH FLOOR FISHER BLDG., DETROIT 2, MICH.

Low Bidders

Indiana—State Hy. Comm., Indianapolis, Aug. 27, bridges, Marshall Co., from Rieth-Riley Constr. Co., 311 W. Madison Ave., Goshen, $69,851, est. $70,067***Monroe Co., from Glen H. Allen, 804 N. Fifth St., Vincennes, $100,342, est. $118,006***6 bridges, Vanderburgh Co., from Winslow Constr. Co., Salem. $143,098, est. $146,182.

Contracts Awarded

Kansas—State Hy. Dpt., Leavenworth, to Otto W. Knutson, 3527 Bway., Kansas City, Mo., Bridge 10.5 $58,322, Bridge 14.3, $49,392; and Bridge 24, $87,205, all Leavenworth Co., Grand total $194,919. Bids 8/16, awarded 8/28.

Contracts Awarded

★ **Maine**—Maine Turnpike Auth., P.O. Box 256, Kennebunk, Bridges, Group 1, York River and Group 8, Saco River, to E. C. Snodgrass, 15 Orkney St., Portland, $463,986 and $638,971 respectively; 39 bridges Group 2, 3, 4, 5, 6, 7 and 9, to Lane Constr. Co., 37 Colony St., Meriden, Conn. $4,194,648. Bids 8/1.

Low Bidders

★ **Maryland**—State Rds. Comn., Baltimore, Aug. 27, Georgia Ave. underpass, in Silver Spring, Montgomery Co., from J. D. Hedin Constr. Co., Anascostia Rd. and Foote St., NE., Wash., D. C. $693,362.

Low Bidders

Michigan—State Hy. Dpt., Lansing, Aug. 22, rein.-con., steel bridge over Clinton River and 1,039 mi. grading and drainage, Oakland Co., from Oak Constr. Co., 520 E. Lincoln Ave., Royal Oak. $148,855.

Contracts Awarded

Neb., Omaha—STADIUM—City, Aug. 20, municipal stadium, to Peter Kiewit Sons Co., Omaha National Bank. $413,995.

Contract Awarded

N. Y., Tonawanda—CRANEWAY—Lake Erie Eng. Corp., Riverview and Woodward Aves., Kenmore, Buffalo, 1 story, 80x50x115 ft., structural steel, rein.-con., brick craneway bldg., Woodward Ave., to Siegfried Constr. Co., Inc., 6 N. Pearl St., Buffalo, $100,000. J. G. Schwartz, 810 Main St., East Aurora, archt.

Low Bidders

★ **New York**—H. A. Cohen, dir. Bureau Contr. & Accounts, Albany, Sept. 4, bridge 0.45 mi. Nassau Co., from Senior & Palmer, Inc., 50 Church St., New York. $545,990. Est. $575,000.

Contracts Awarded

Pa., Sunbury—The Reading Co., Reading Terminal, Phila., 2 steel bridges and 1 concrete arch, to American Bridge Co., Broad St. Station Bldg., Phila. Over $250,000. Awarded 8/23.

Low Bidders

South Carolina—State Hy. Dpt., Columbia, Aug. 20, bridge over Turkey Creek, Abbeville Co., from Pennell & Harley, Inc., Spartanburg, $30,199***bridge over Lynches River, etc., Lee Co., Alt. 1, from Simons-Mayrant, 16 Broad St., Charleston. $142,079.

Low Bidders

Texas—State Hy. Dpt., Austin, Aug. 28, bridge, culverts 0.015 mi. Williamson Co., from Wallace & Bowden, 5513 E. Grand Ave., Dallas, $98,606; overpass and I-Beam structures Montgomery Co., from Austin Bridge Co., P. O. Box 1590, Dallas, $190,175.

Low Bidders

Vermont—State Hy. Dpt., Montpelier, Aug 9, removing superstructures and reconstructing superstructures of 12 bridges, from Oscar Olson, Montpelier. $47,773.

Contract Awarded

Tex., Beeville—Bee Co., J. C. Beasley, judge, Beeville, bridge work, to Austin Bridge Co. P. O. Box 1590, Dallas, $171,211. Est. $175,000. Bids 8/27.

Low Bidders

★ **Virginia**—State Hy. Dpt., Hy. Richmond, Aug. 8, bridge, etc., Loudoun Co., from M. J. Grove Lime Co., Lime Kiln, Md., $159,668*** bridge over Tinkers Creek, etc. Roanoke and Botetourt Counties, from A. B. Torrence, Elkton, $194,539.

Low Bidders

Washington—State Hy. Dpt., Transportation Bldg., Olympia, Aug. 13, imprv. bridge over Great Northern Ry. tracks, etc., Stevens Co., from MacRae Bros., 2733 4 Ave. S, Seattle, Zone 4, $471,502.

Low Bidders

Wash., Seattle—City, County-City Bldg., Zone 4, Aug. 22, bridge on Magnolia Blvd. across 32 Ave. W. from General Constr. Co., 3840 Iowa St., Zone 4. $76,015. Est. $66,538.

Structural & Piping—Buildings—All Types

Contracts Awarded

★ **Ala., Auburn**—DORMITORY—Alabama Polytechnic Institute, c/o Dr. L. N. Duncan, dormitory, to Daniel Constr. Co., 824 7 Ave. S., Birmingham. Approx. $900,000.

Contracts Awarded

Ala., Birmingham—WAREHOUSE—Frisco Lines, 107 N. 20 St., railroad freight warehouse, to Day & Richardson, 429 S. 24 St. Est. $246,000.

Contract Awarded

★ **Ala., Decatur**—PLANT—Calumet & Hecla Consolidated Copper Co., Wolverine Tube Div., Calumant, Mich., copper tubing, copper products plant, to Foster-Creighton Co., American Natl. Bank Bldg., Nashville, Tenn. Est. $3,000,000. Howard, Hickerson & Dinkins, Inc., 304½ 3 Ave., Nashville, Tenn., archts.

Low Bidders

★ **Ala., Florence**—DORMITORY—State Bd. Educ., Conference Rm., Montgomery, Aug. 27, dormitory at State Teachers College, from Daniel Constr. Co., 822 7 Ave. S, Birmingham. $535,919.

Contracts Awarded

Ala., Monroeville—MILL—Monroe Mills, c/o pres., altering and addns., mill, to C. M. Guest & Son, Anderson, S. C. $260,000. J. E. Sirrine Co., Greenville, engrs.

Low Bidders

Ala., Jacksonville—DORMITORY—State Bd. Educ., Conference Rm., Montgomery, Aug. 27, dormitory, from Jones & Hardy, Montevello. $208,777.

Contracts Awarded

★ **Ark., Ft. Smith**—PLANT—City, c/o Chamber of Commerce, brick, concrete, steel, container mfg. plant, to Ditmars-Dickman-Pickens Constr. Co., Gazette Bldg., Little Rock. $500,000.

Contracts Awarded

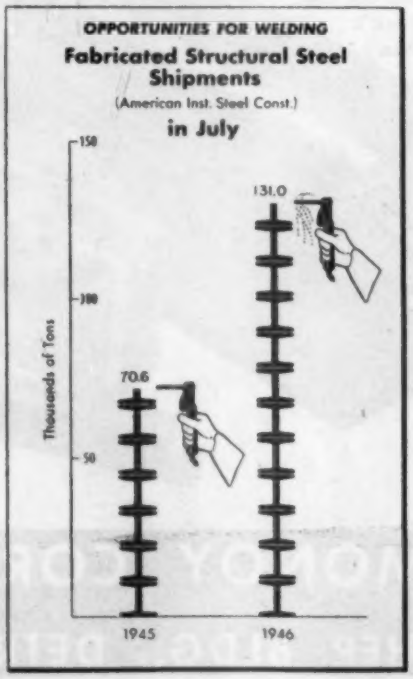
★ **Ark., North Little Rock**—PLANT—City, c/o F. O. Neely & Viaking Corp., lessee, 6733 W. 65 St., Chicago, Ill., 1 story plastic plant, to Ditmars-Dickmann-Pickens Constr. Co., Gazette Bldg., Little Rock. Est. $600,000. Erhart, Eichenbaum & Rauch, Pyramid Bldg., Little Rock, engrs.

Contracts Awarded

Calif., Bell Gardens—PLANT—Calif. Metal Enameling Co., 6650 E. Slauson Ave., 1 story, 60x110 ft., steel, metal enameling plant addn., to H. F. Hendrickson Co., 2811 Clearwater St., Los Angeles. $125,000. D. R. Edwards, 5911 Pine Ave., Maywood engr.

Contracts Awarded

Calif., Burbank—PLANT—Freeze-It Corp., 10 W. Magnolia St., 1 and part 2 story rein.-con. cold storage plant, loading dock, spur track, etc., to Wm. J. Moran Co., 1011 S. Freemont St.



Alhambia. Approx. $350,000. Homer D. Rice, 1272 S. Bronson Ave., Los Angeles, archt.

Low Bidders

★ **Calif., Huntington Park**—COURT & JAIL—City, City Hall, Aug. 19, Justice Bldg. and Jail, from James I. Barnes Constr. Co., 1119 Montana St., Santa Monica. $664,910.

Contract Awarded

Calif., Pittsburg—PLANT—The Dow Chemical Co., Pittsburg, steel, iodine production plant, absorption towers, storage tanks, warehouse, Centinela, Ave. near Inglewood Blvd., Los Angeles Co., to The Austin Co., 777 E. Washington Blvd., Los Angeles. $150,000.

Contract Awarded

★ **Calif., Redondo Beach**—STEAM PLANT—Southern Calif., Edison Co., 601 W. 5 St., Los Angeles, design and construction, 130x240 ft., 55x100 ft. frame, rein-con., brick steam plant, craneways, stacks, tanks, etc., 7 and Hermosa Sts., to Stone & Webster Engrg. Corp., 601 W. 5 St., Los Angeles. $1,837,000.

Contracts Awarded

Calif., Redwood City—SCHOOL—City Elementary School Dist., two 1 story classroom bldgs., corner Charter and Stambaugh Sts., to Peter Sorensen, 927 Arguello St. $205,036. Ernest J. Kump Co., 251 Kearny St., San Francisco, archts.

Contracts Awarded

Calif., Richmond—FOUNDRY, etc.—Parr-Richmond Terminal Corp., F. D. Parr, pres., 1 Drumm St., San Francisco, 150x180 ft., steel foundry, warehouse, office, to W. C. Tait Co., 461 Market St., San Francisco. Est. $300,000.

Contract Awarded

★ **Calif., San Jose**—STORE—Roos Bros., Market St., at Stockton St., San Francisco, 6 story, bsmnt., rein-con., steel department store, to Dinwiddie Constr. Co., Crocker Bldg., San Francisco. Est. $1,000,000. A. R. Williams, 251 Post St., San Francisco, archt. W. Adrian, 417 Market St., San Francisco, engr.

Contract Awarded

Calif., Vallejo—WAREHOUSE—General Mills Inc., 160 New Montgomery St., San Francisco, design and construction warehouse, loading dock, to Utah Constr. Co., 1 Montgomery St., San Francisco. Est. $174,000.

Contract Awarded

Calif., Ventura—PLANT—Southern Counties Gas Co., 810 S. Flower St., Los Angeles, 100x40 ft. plant addn., remodeling compressor station, to OFFCO Constr. Co., Inc., 2650 Cherry Ave., Long Beach. $200,000.

Contract Awarded

Calif., Whittier—PLANT—Cherry River Paper Co., 205 N. Glendale Ave., Glendale brick, steel, rein.-con. mfg. plant, to Waale, Campian Co. & Smith, Inc., 1670 Beverly Blvd., Los Angeles. Approx. $250,000. E. E. Woerfel, 5311 N. 34 St., Milwaukee, Wis., archt. Walter Oeflein, Inc., 5345 N. Hopkins St., Milwaukee, Wis., engr.

Contract Awarded

Calif., Willits—PLANT—Ralph Padula, 459 N. Kilkea Dr., Los Angeles, design and construction steel plant, to Harrah Bros. Machine Works, Main St. Est. $125,000.

Contracts Awarded

Conn., Cromwell—GREENHOUSE—A.N. Pierson, Inc., Cromwell, 6 units, 80x600 ft., greenhouse group, to Lord & Burnham Irvington, N. Y. $215,000.

Contract Awarded

Conn., Hartford—FACTORY—G. F. Heublein & Brother, Inc., 330 New Park Ave., 2 story, bsmnt. 105x300 ft., brick, steel concrete factory, to Wadhams & May Co., 15 Lewis St. Est. $300,000. Fletcher Thompson, Inc., 211 State St., Bridgeport, archt.

Soon Lets Contract

Conn., Norwalk—FACTORY—Charles of the Ritz, Norwalk, 1 and 2 story, brick, steel, concrete factory. $450,000. Fletcher Thompson, Inc., 211 State St., Bridgeport, archt.

Contract Awarded

Del., Wilmington—PLANT—J. Bancroft & Son Co., Rockford, mfg. plant alterations, separate contracts. $215,000. H. A. Kuljian & Co., 1518 Walnut St., Philadelphia, Pa., archt. & eng.

Low Bidders

★ **D. C., Wash.**—SCHOOL—District Comrs., District Bldg., Sept. 6. Richardson School, 53 and Blaine Sts. N.W., from J. D. Hedin Constr. Co., 820 Michigan Ave. N.E. $511,200.

Contract Awarded

Fla., Jacksonville—WAREHOUSE—Winn & Lovett Co., 1357 W. Beaver St., warehouse, refrigerator plant, to D. O. Foshee, 1993 Largo Rd., Zone 7, $230,000.

Contract Awarded

★ **Fla., Tarpon Springs**—PLANT—Victor Chemical Co., c/o W. B. Brown, vice-pres., 141 W. Jackson Ave., Chicago, Ill., phosphate plant, on Anclote River, to Foster & Creighton Co., American Natl. Bank Bldg., Nashville, Tenn. $2,000,000.

Contracts Awarded

★ **Ga., Atlanta**—HANGAR, etc.—Delta Air Lines, Municipal Airport, steel, concrete, brick, hangar, 2 story office bldg., to Austin Co., 16112 Euclid St., Cleveland, O. $1,000,000.

Contract Awarded

Ill., Bensenville—FACTORY—Kieckhefer Container Co., 1715 W. Canal St., Milwaukee, Wis., 1 story, 180x250 ft., brick, concrete, steel factory, to W. W. Oeflein, Inc., 5345 N. Hopkins St., Milwaukee, Wis. $182,400. E. Woerfel, c/o contractor, archt.

Soon Lets Contract

★ **Ill., Chicago**—PLANT—Regensteiner Corp., 310 S. Racine Ave., soon lets contract, 4 story, 178x195 ft., brick, concrete, steel printing plant addn. $500,000. Friedman, Alschuler & Sincere, 28 E. Jackson Blvd., archts.

Contract Awarded

Ill., Chicago—HOSPITAL—Illinois Masonic Hospital, 834 Wellington St., 5 story, 81x175 ft., brick, concrete, steel, stone hospital wing addn. to J. W. Snyder Co., 307 N. Michigan Ave. Est. $350,000.

Contract Awarded

★ **Ill., Chicago**—SCHOOL—University of Illinois, Physical Plant Dpt., 721 S. Wood St., remodeling Navy Pier into 100 classrooms, to M. J. McDermott Co., 30 N. LaSalle St. Est. $600,000.

Contract Awarded

★ **Ill., Chicago**—HOSPITAL—South Chicago Community Hospital, 2320 E. 93 St., 5 story, brick, concrete, steel hospital addn., to Paul Schwendener, 7553 S. Chicago Ave. $600,000. H. Frenzel, 127 N. Dearborn St., archt.

Contract Awarded

Ill., Evanston—SCHOOL—St. Athanasius Pariah, 1615 Lincoln St., 2 story, concrete, stone, steel, school, assembly hall, to James McHugh Constr. Co. 6449, South Park Ave., Chicago. $300,000.

Low Bidders

★ **Ill., Joliet**—PENETENTIARY—State Dpt. P. Safety, Armory Bldg., Springfield, Aug. 27, general contract altering West Cell House, Joliet Branch, Illinois State Penitentiary, from Federal Contructors, 407 S. Dearborn St., Chicago, $726,540***electrical work, from Public Electric Constr. Co., 3526 W. Lake St., Chicago, $63,045***heating, ventilating and plumbing, from Associated Piping Contractors, Inc., 1223 W. 18 St., Chicago, $66,896.

Low Bidders

★ **Ill., Pontiac**—PENETENTIARY—State Dpt. P. Safety, Armory Bldg., Springfield, Aug. 27, general contract altering North Cell House, Illinois State Penitentiary, from J. L. Simmons Co., 2146 N. Woodford St., Decatur, $915,000***heating, ventilating and plumbing work, from Carson-Payson Co., 616 N. Jackson St., Danville, $102,391.

Contract Awarded

★ **Ind., Gary**—MILL—National Tube Co., Gary, 1 story, concrete, seamless tube rolling mill addn., to Aetna Standard Engr. Co., Home Saving & Loan Bldg., Youngstown, O. Est. $700,000.

Contract Awarded

★ **Ia., Charles City**—PLANT—Salsbury's Laboratories, c/o J. E. Salsbury, Charles City, general contract mfg. plant, to Rye & Henkel, Mason City, Est. $600,000. Hansen & Waggoner, Mason City, archts.

Contract Awarded

Kan., Kansas City—SERVICE BLDG.—Kansas City Public Service Co., c/o Powell Croner, 728 Delaware St., Kansas City, Mo., utility service bldg., to Long Constr. Co., Rialto Bldg., Kansas City, Mo. $300,000.

Contract Awarded

★ **La., Delhi**—PLANT—Sun Oil Co., 1608 Walnut St., Phila., Pa., natural gas processing plant, separate contracts. $1,000,000. Petroleum Engrg. Co., Commerce Bldg., Houston, Tex., engr.

Low Bidders

La., New Orleans—Warner Bros. Co., 150 S. Liberty St., August 6, 2 story, rein.-con., steel, brick, exchange bldg., from Cris Larsen Co., 2823 Gen. Pershing Ave., $342,208.

Low Bidders

★ **Massachusetts**—TREATMENT PLANT—Commonwealth of Massachusetts, 20 Somerset St., Boston, July 31, Nut Island sewerage treatment plant, aeration and sedimentation, influent and effluent conduits, etc., from V. Barietta Co., 10 Whipple Ave., Roslindale, $1,179,736.

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Low Bidders

★ **Mass., Belchertown**—SERVICE BLDG.—Comm. of Mass. Dpt. Mental Health, 100 Nashua St., Boston, Aug. 30, brick, steel, infirmary-service bldg., from Platt Contracting Co., 99 First St., Cambridge. $835,000.

Contracts Awarded

★ **Mass., Chelsea**—HOSPITAL—Commonwealth of Mass., Soldiers Home, 91 Crest Ave., 3 to 7 story, 75x235 ft. and 25x205 ft., brick, steel, limestone, granite hospital, to M. S. Kelliher Co., 294 Washington St., Boston. $2,175,000. Bids 7/25.

Contracts Awarded

Mass., East Douglas—PLANT—Hayward-Schuster Woolen Mills, Inc., S. Main St., Douglas, 2 story, 200x365 ft. plant addn., to Theodore H. Engvall, 7 Barrows Rd., Shrewsbury. Est. $300,000. Charles T. Main, 201 Devonshire St., Boston, archt.

Contract Awarded

Mass., Northampton—INFIRMARY—Smith College. Bd. Trustees, Northampton, brick, steel infirmary addn., on Campus, to George A. Fuller Co., 11 Beacon St., Boston. $205,000. Coolidge Shepley Bulfinch & Abbott, 1 Court St., Boston, archts.

Low Bidders

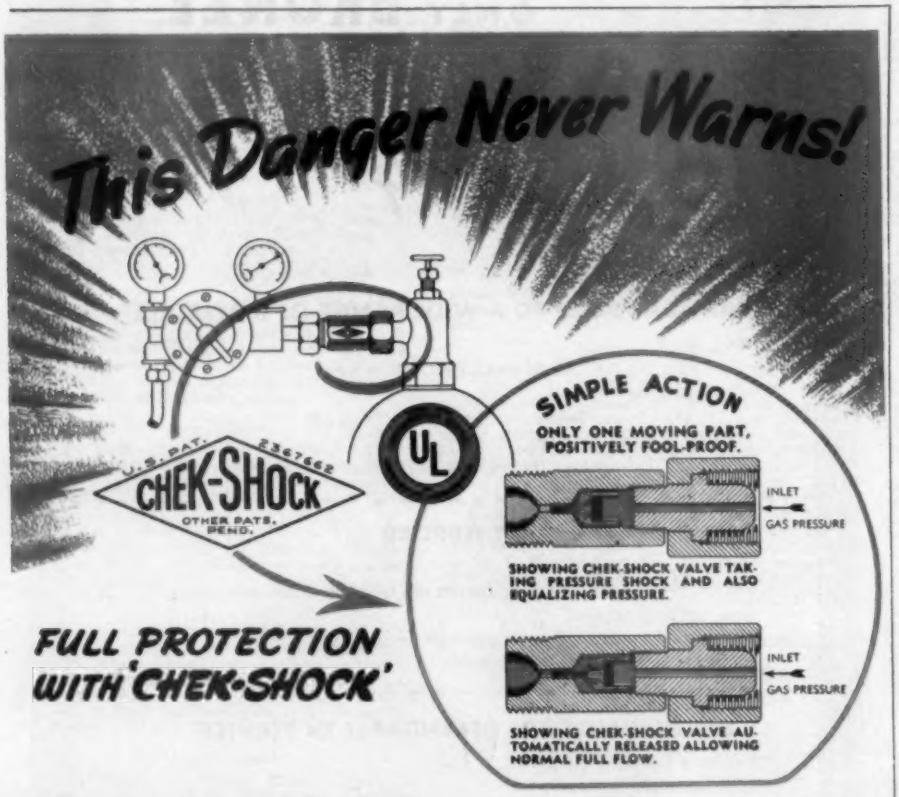
★ **Mich., Houghton**—SCHOOL—State, State Office Bldg., Lansing, Aug. 12, brick, steel, concrete physical education bldg., at College of Mining and Technology, from A. H. Prokasch, Iron River. $650,000.

Low Bidders

★ **Mich., Ionia**—POWER PLANT—Ionia State Hospital, Ionia, brick, steel, rein-con. power plant, at Ionia State Hospital, from Lansing Heating & Ventilating Co., 1213 Center St., Lansing. $908,000.

Contract Awarded

★ **Minn., Minneapolis**—HOSPITAL—Asbury Hospital, A. L. Fletcher, secty.-treas., 916 E. 15 St., 5 story, rein.-con., brick, hospital unit at 14 St. and Elliot Ave., to J. Leck Co., 211 S. 11 St. $900,000.



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Contract Awarded

Minn., St. Paul—RAILROAD BLDGS.—Northern Pacific Ry. Co., B. Blum, ch. engr., 175 E. 5 St., Zone 1, general contract, constructing Diesel overhaul shops, overhaul and refit existing structure to handle Diesel locomotive overhaul incl. larger units, cranes and other equip. in Mississippi yards, to A. Johnson Constr. Co., 608 Foshay Tower, Minneapolis. $380,000.

Contract Awarded

Mo., St. Louis—BLDG. ADDN.—Southwestern Bell Telephone Co., Shields R. Smith, mgr., Telephone Bldg., 1010 Pine St., Zone 1, 2 story top addn. to existing 4 story bldg., 3 story and bsmt., 40x65 ft. addn. to telephone bldg., 2654 Locust St., to Dickie Constr. Co., Loederman Bldg., 317 North 11 St., Zone 1, approx. $450,000.

Soon Lets Contract

★ **Neb., Scottsbluff**—HOSPITAL—Catholic Sisters of St. Francis, 2825 W. 32 Ave., soon lets contract hospital at St. Mary Hospital, $1,000,000. F. McNett, Grand Island, archt.

Contract Awarded

N. J., Asbury Park—MEDICAL BLDG.—Medical Arts Bldg. Corp., 501 Grant Ave., 5 story, 75x90 ft., brick, steel medical arts bldg., to John J. Wise & Co., Inc., 67 W. 44 St., New York, N. Y. $250,000. Bids 7/26 awarded 8/27. C. H. Wolf, 112 S. 16 St., Phila. Pa., engr.

Contract Awarded

N. J., Lakewood—BUS TERMINAL, etc.—Lincoln Transit Co., Lakewood, 1 story, bsmt. 50x100 ft., concrete block, steel bus terminal and garage, to M. C. Yaskin, 5934 Baltimore Ave., Phila., Pa., $200,000. Awarded 8/28. The Ballinger Co., 105 S. 12 St., Phila., Pa., archts.

Contract Awarded

N. J., Lakewood—PLANT—Lakewood Cold Storage & Refrigeration Co., cold storage, refrigeration, and locker bldg., separate contracts. $250,000. Van Rensaeller H. Greene, 11 Park Place, New York, engr.

Contract Awarded

N. J., New Brunswick—PLANT—Zonite Products Corp., 370 Lexington Ave., New York, N. Y., mfg. plant addn., to Walter Kidde Constructors, Inc., 140 Cedar St., New York, N. Y. $300,000.

Contract Awarded

★ **N. J., Paulsboro**—LABORATORY—Socony Vacuum Oil Co., Paulsboro, 2 story, 53x260 ft., brick, steel frame, chemical research laboratory, to Turner Constr. Co., 1500 Walnut St., Phila. $800,000. Awarded 8/8.

Contract Awarded

N. J., Trenton—WAREHOUSE—Westinghouse Electric Mfg. Corp., Union Bank Bldg., Pittsburgh, Pa., 513x640 ft. 1 story, brick, structural steel warehouse, to Frank Briscoe Inc., 287 S. 19 St., Newark, over $250,000. Lewis C. Meckling Jr. Co., Maloney Bldg., Pittsburgh, Pa., archts.

Low Bidders

N. Y., Brooklyn—HOUSING—New York City Housing Auth., 122 E. 42 St., New York, Zone 17, Aug. 13, superstructure and mechanical work for Brownsville Houses, from George F. Driscoll Co., 41 E. 42 St., New York, Zone 17, $5,861,795; plumbing, from J. L. Murphy, Inc., 340 E. 44 St., New York, Zone 17, $1,098,000; heating, from Dierks Heating Co., 43-32 33 St., Long Island City, $562,000; electric from H. A. Schwartz Co., 163-18 Jamaica Ave., Jamaica, $346,500.

Contract Awarded

N. Y., North Tonawanda—WAREHOUSE—Durez Plastics & Chemicals, North Tonawanda, 1 story, 160x200 ft., structural steel, rein. con., brick finished products warehouse, to Siegfried Constr. Co., Inc., 6 N. Pearl St., Buffalo, $400,000.

Contracts Awarded

†**N. Y., New York**—CLINIC—Pub. Bldg. Admin., 18 and F Sts. N. Y., Wash. 25, D. C., remodeling 4 and 9th floors incl., at 215 W. 24 St., and remodeling, incl. air-conditioning for Mental Hygiene Clinic on 9th floor 272 W. 7 Ave., to James King & Son, Inc., 350 5 Ave., New York. $207,000.

Contract Awarded

O., Akron—FACTORY—Goodyear Tire & Rubber Co., 1144 E. Market St., 1 story, brick factory, making steel rims, to Clemmer Constr. Co., 134 E. Thornton St. $380,500; structural steel erection to Burger Iron Co., 1324 Firestone Pkwy.

Contract Awarded

O., Cleveland—BLDG. ADDN.—Ohio Bell Telephone Co., 750 Huron Rd., 2 story bsmt., 44x98 ft., brick, steel, addn. to Glenville Exchange, 12223 St. Clair Ave., to Hunkin-Conkey Constr. Co., 1740 E. 12 St. Est. $370,000.

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PAGE STEEL AND WIRE DIVISION
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Contract Awarded

★ **O., Lorain**—MILL—National Tube Co., Lorain, installing continuous seamless pipe mill at Lorain plant, to Aetna-Standard Engrg. Co., Home Savings & Loan Bldg., Youngstown. $1,000,000 or more. Awarded 8/20.

Contract Awarded

O., Niles—FACTORY—American Brakeshoe Co., 230 Park Ave., New York, 1 story, part mezzanine, 60x300 ft. and 120x120 ft. brick, steel, concrete factory and office bldg., to James Stewart Co., 230 Park Ave., New York. Est. $350,000.

Contract Awarded

O., Shaker Heights—APARTMENTS—H. L. Ehlert, 1549 Kew Ave., twelve 5 family brick, steel, concrete apartment houses at Warrensville Center and Krisman Rd., Owner builds, $300,000.

Contract Awarded

Pa., Phila.—City Dpt. P. Wks., City Hall Annex, Queen Lane filter plant imprvs., WW1-304, to Roberts Filter Mfg. Co., 6 St. and Columbia Ave., Darby. $152,290. Bids 8/14.

Contract Awarded

Tex., Athens—HANGAR—Athens Independent School Dist., 130x160 ft. hanger for farm mechanical repair shop and community cannery, to Buck Gibbs, Athens. Approx. $58,000. Roy Kilmer, Greenville, archt.

Contract Awarded

Tex., Houston—PLANT—Austin Bros., 1815 Cooms St., Dallas, steel fabricated plant, to O'Rourke Constr. Co., 4011 Koehler St., approx. $86,000.

Contract Awarded

Tenn., Memphis—WAREHOUSE—U. S. Rubber Co., c/o B. J. Brady, mgr., 713 Linden St., 1 story 150x300 ft. brick, concrete, steel warehouse, to Seth E. Giem, 166 Monroe Ave. Est. $200,000. Raymond B. Spencer, 1 National Bank Bldg. archt.

Contract Awarded

★ **Tex., Dallas**—TREATMENT PLANT—City, Earl Goforth, secy., addn., imprvs. to Backman water purification plant, Sect. 2. Clear Watermain 2, and exten. filter house, to Norgaard & Shaw & Vilbig Const. Co., 817 Bourbon St. $562,110.

Contract Awarded

Tex., Denver City—PLANT—Frontier Chemical Co., c/o R. L. Wood, pres., Midland, electrochemical mfg. plant. Owner builds. $475,000.

Contract Awarded

★ **Tex., Houston**—OIL DISTILLATION PLANT—Sinclair Refining Co., Gulf Bldg., oil distillation plant, to Fluor Corp., Ltd., M. Esperson Bldg. $2,200,000. H. L. Haas, c/o owner, engr.

Contract Awarded

★ **Tex., Victoria**—COMPRESSOR STATION—Tennessee Gas & Transmission Co., Commerce Bldg., Houston, 8,000 hp. compressor station, force account, approx. $800,000; expan. 19 angle compressor station units, force account, approx. $1,900,000.

Low Bidders

★ **Vt., Waterbury**—HOSPITAL—State, State Capitol, Montpelier, Sept. 5, two 3 story hospital wings, 3 story, bsmnt. nurses homes, all brick, steel, concrete, from Volpe Constr. Co., 54 Eastern Ave., Malden, Mass., $544,709 and $209,400 respectively.

Contract Awarded

Va., Richmond—EXCHANGE—Chesapeake & Potomac Telephone Co., 703 E. Grace St., telephone exchange bldg., 3910 Hull St., South Richmond, to Doyle & Russell, Central National Bank Bldg., 219 East Broad St., $350,000. M. C. Lee, 110 N. 7 St., archt. J. Posey, 10 E. Pleasant St., Baltimore, Md., consult. engr.

Low Bidders

Wash., Bellingham—DORMITORY—Western Washington College of Education, Bellingham, general contract men's residence hall, from Chisholm & Eiford, 1726 State St., $261,000; mechanical from A. J. Blythe Plumbing & Heating Co., 1313 R. R., $49,662.

Contracts Awarded

★ **Wash., Seattle**—HANGAR, etc.—Northwest Airlines, Inc., 1885 University Ave., St. Paul, Minn., hangar and repair facilities at Seattle-Tacoma Airport, to The Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $1,000,000.

Contract Awarded

Wash., Shelton—MACHINE SHOP—Simpson Logging Co., Shelton, 110x180 ft., machine shop, 40x140 ft., car repair shop, 32x120x130 ft., warehouse and 8-stall warehouse, to The Austin Co., 16112 Euclid Ave., Cleveland, O. $300,000.

Contract Awarded

★ **W. Va., Follansbee**—COKE OVENS—Wheeling Steel Corp., Wheeling Steel Corp. Bldg., Wheeling, two 53 battery coke ovens, to Koppers Co., Koppers Bldg., Pittsburgh, Pa., and 500 ft. high, silica brick stack, to Rust Engrg. Co., Rust Bldg., Pittsburgh, Pa., $5,000,000.

Contract Awarded

Wis., Burlington — PLANT — Burlington Brewing Co., 3101 S. California Ave., Chicago, Ill., 1 story, brick, steel, rein.-con., bottling plant addn., to Oliver Constr. Co., 136 N. Main St., Oconomowoc, $250,000. Chas. S. Muller, 3706 N. Richmond St., Chicago, Ill., archt.

Contracts Awarded

Wis., Green Bay—INCINERATOR—City, City Hall, 2 story, 53x77 ft., rein.-con., steel, brick incinerator bldg., to H. Bishop, 1120 McCormick St., $115,674; furnaces and stack, to Pittsburgh-Des Moines Steel Co., 38 S. Dearborn St., Chicago, Ill. $79,650. Bids 8/2.

Low Bidders

Wis., Milwaukee—PLANT ADDITIONS—International Harvester Co., 1714 W. Bruce St., Zone 3, 7 story, 24x56 ft., concrete fdn., steel sand hopper and mixer and 1 story, 103x132 ft., concrete fdn., steel sand storage bldg., from Permanent Constr. Co., 4100 N. 3rd St., Zone 12. $330,000. C. DeLeuw, 20 N. Wacker Dr., Chicago, Ill., and A. Coon, c/o owner, engrs.

Contract Awarded

Wis., West Allis—FACTORY—LeRoi Co., 1706 S. 68 St., Zone 14, 1 story, 50x400 ft., concrete block, steel factory addn., to Krug & Smith Co., 111 E. Wisconsin Ave., Milwaukee, Zone 2. Est. $224,000.

Contract Awarded

†**Wyoming**—POWER PLANT—Bureau Reclamation, Cody, Heart Mountain power plant, Shoshone River, Spec. 1385, to Samuels & Franklin, Los Angeles, Calif., and Gibbons & Reed Co., 259 W. 3 St., S., Salt Lake City, Utah, $366,399. Bids 7/19.

LATIN AMERICA

Nicaragua, Montelimar—The Texas Co., P. O. Box 320, Long Beach, 1, Calif., mechanical repair garage, shop, warehouse, pumphouse, pipe lines, etc., to Transpacific Constr. Co., Long Beach, Calif. $2,165,000. W. A. Thompson, Jr., c/o owners, engr.

Venezuela, El Algodonal—National Health Ministry, Caracas, taking bids Nov. 1, tuberculosis hospital. $500,000.

Venezuela, Falcon—Creole Petroleum Co., T. Cook, Caracas, bids in 3 months, housing, streets, sewage, water, apts., amusements, etc., refinery site. $4,000,000.

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The cast iron rear bed plate of this large extrusion press was fractured at the corner. To replace this 19,000 pound casting would require months of waiting. However, during removal and installation of a new main cylinder the bed plate was repaired in 8 hours by brazing with approximately 200 pounds of Bridgeport's No. 192 low fuming rod. Since then several months have elapsed and the press has been in practically continuous operation without any sign of failure.

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WEIGHTS AND MEASURES

Length

1 mil = 0.001 in.
1 inch = 2.54 centimeters = 25.4 millimeters.
1 link = 7.92 inches = 20.12 centimeters.
12 inches = 1 foot = .30479 meter = 30.5 centimeters.
3 feet = 1 yard = .91437 meter = 36 inches.
5½ yards = 1 rod or pole = 16½ feet = 198 inches.
22 yards = 1 chain = 4 rods = 66 feet = 100 links.
40 rods = 1 furlong = 220 yards = 660 feet = 10 chains.
8 furlongs = 1 statute or land mile = 320 rods = 1,760 yards.
5,280 feet = 1 statute or land mile = 1.609 kilometers.
1 geographical or nautical mile = 1 minute = 1/60 degree.
1 nautical mile, British standard = 6,080 feet.
1 nautical mile = 1.1515 statute or land miles.
1 statute or land mile = .869 nautical mile.
3 nautical miles = 1 league.

Square Measure

1 square yard = 9 square feet = .836 square meter.
1 square foot = 114 square inches = 920 square centimeters.
1 square inch = 6.4514 square centimeters.
A section of land is 1 mile square = 640 acres.
1 acre = 43,560 square feet = .40467 hectare.
1 square acre = 208.71 feet on each side.

Cubic Measure

1 cubic yard = 27 cubic feet = 7,645 cubic meters.
1 cubic yard = 201.97 (wine) gallons = 7.645 hectoliters.
1 cubic foot = 1,728 cubic inches = 28,315.3 cubic centimeters.
1 cubic foot = 7.4805 (wine) gallons = 28.315 liters.
1 cubic foot = 6.2355 imperial gallons.
1 cord of wood = 128 cubic feet, being 4 × 4 × 8 feet.
1 perch of stone = 24¾ cubic feet, being 16½ × 1½ × 1 feet, generally taken as 25 cubic feet.

Liquid Measure

1 gill = ¼ pint = 7.22 cubic inches = 4 fluid ounces.
1 pint = 28.88 cubic inches = 16 fluid ounces.
2 pints = 1 quart = 57.75 cubic inches = .9463 liter.
4 quarts = 1 gallon = 231 cubic inches = 3.7852 liters.
1 imperial gallon = 277.463 cubic inches = 4.8045 quarts.

Dry Measure

1 standard U.S. bushel = 2150.42 cubic inches.
1 standard U.S. bushel = 4 pecks.
1 peck = 2 gallons = 8 quarts.
1 gallon = 4 quarts = 268.8 cubic inches.
1 quart = 2 pints = 67.2 cubic inches.
100 bushels = 124.5 cubic feet (approximately).
80 bushels = 100 cubic feet (approximately).

Avoirdupois Weight

1 pound = 16 ounces = 7,000 grains = .45359 kilograms = 453.59 grams.
1 ton = 2,240 pounds. A short ton = 2,000 pounds.
A fluid ounce is a measure of capacity and means in the American system 1/16 pint wine measure.
1 fluid ounce = 1.042 ounces avoirdupois.
1 fluid ounce = 455.6 grains of distilled water.
1 fluid ounce = 29.52 cubic centimeters.
In England one fluid ounce means 1/20 imperial pint = 1 imperial ounce = 437.5 grains of distilled water = 28.35 cubic centimeters.
1 metric ton = 1000 kilograms = 2,205 pounds.

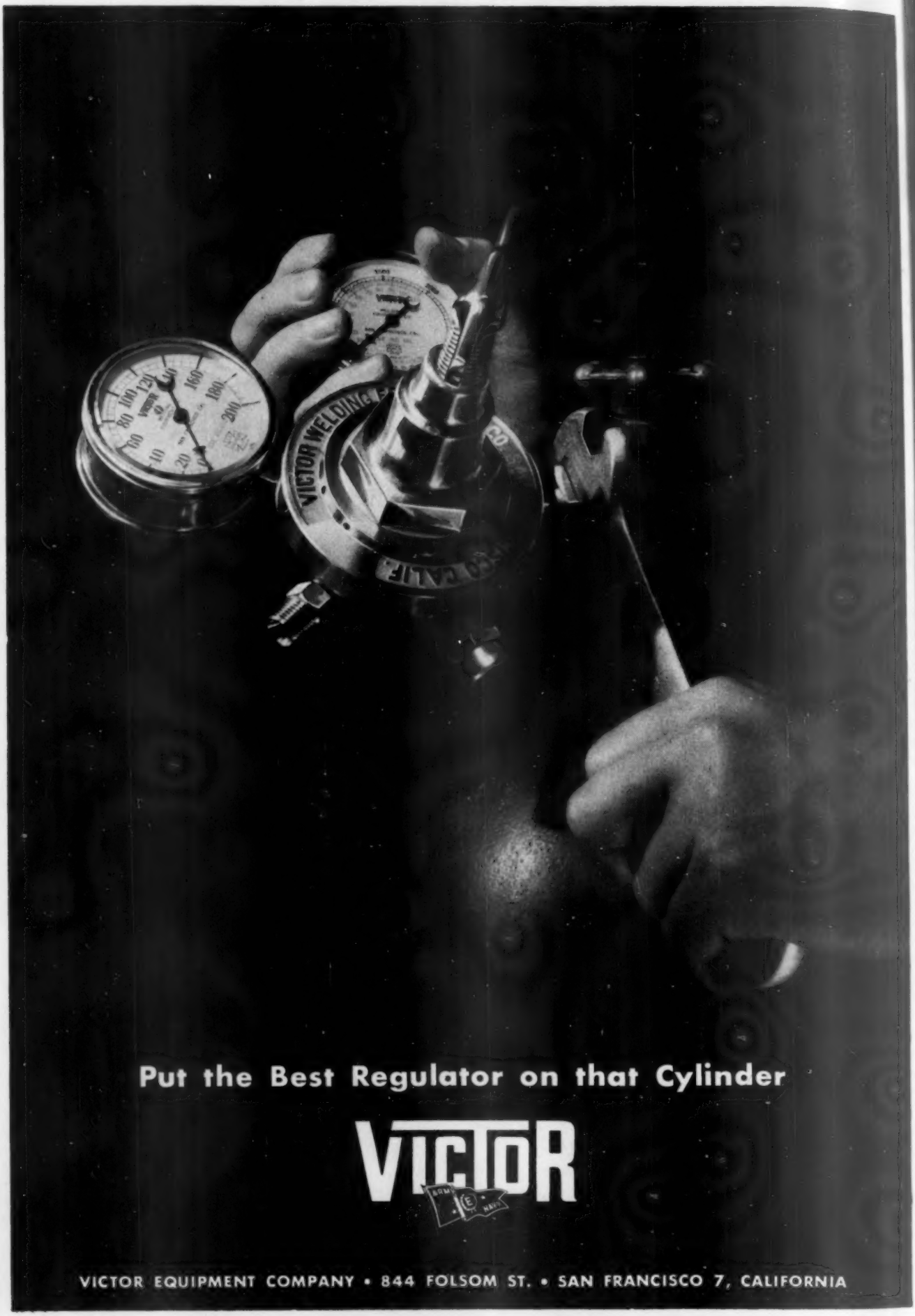
Troy Weight

*1 pound = 12 ounces = 5,760 grains = .37324 kilograms.
1 ounce = 20 pennyweights = 1.0971 ounces avoirdupois.
1 pennyweight = 24 grains.
1 karat used in weighing diamonds = 3.168 grains = .205 gram.

Apothecaries' Weight

*1 pound = 1 pound troy weight = 12 ounces.
*1 ounce = 8 drachms.
1 drachm = 3 scruples.
1 scruple = 20 grains.

* NOTE: *The pound and ounce are the same in apothecaries' as in troy weight. One ounce avoirdupois is 437.5 grains, and 1 ounce troy is 480 grains, but 1 grain has the same value in troy, apothecaries' and avoirdupois and is equal to .0648 gram in the metric system.*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Your Name John Smith
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22 SELF-FLUXING SOLDER—Alpha Metals, Inc., Brooklyn 1. 4-page bulletin T-200-546-10 describes "Tri-Core," a self-fluxing solder which has three cores located beneath the outer surface of the wire. The 3-core design is said to assure continuous flux flow, thus helping to prevent slowdowns in production soldering operations.

23 FARM WELDER—General Electric Co., Schenectady 5. 4-page bulletin (GEA-4630) explains the technical details of a new farm welder conforming to NEMA standards and EEI and REA requirements and designed specifically for farm use. It is available in 130 and 180 amp sizes.

24 WELDING PROCEDURE—Ampco Metal, Inc., Milwaukee 4. 2 sets of arc welding procedure sheets "Ampco Procedure for Welding Silicon-Bronze" and "Ampco Welding Procedure for Beryllium-Copper" cover recommended electrodes, polarity and current, preparation, preheat and other technical data on the welding of the base metal under construction.

25 WELD CONTROL—General Electric Co., Schenectady 5. 12-page booklet (No. GEA-4571), "The Importance of Control in Resistance Welding," discusses the fundamentals of electronic contactors and timers for spot welding, seam and roll-spot welding, flash welding. Circuit diagrams and sine waves make clear the various principles described in the text.

26 WELD STRESSES—Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin 360, "Investigation of the Strength of Riveted Joints in Copper Sheets," describes tests of riveted joints connecting copper sheets that failed in the following ways: (1) By tearing out of rivets to the edge of the sheet; (2) by shearing of the rivets; (3) bearing pressure of the rivets against the edge of the holes in the sheet; (4) by tension failure of the sheet between the rivets.

27 HIGH-TENSILE STEEL—Great Lakes Steel Corp., Detroit 18. 4-page bulletin, "The New Arithmetic in Steel," discusses the present trend of industry toward low-alloy, high-tensile steels and gives numerical examples of the savings to be effected. Data on the physical properties of N-A-X high-tensile steel are also included.

28 ALUMINUM-BRONZE ELECTRODES—Ampco Metal Inc., Milwaukee 4. 8-page bulletin describes the five grades of aluminum-bronze a-c/d-c shielded-arc electrode for all-position metal-arc welding.

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29 ELECTRODES AND RODS—Hollup Corp., Chicago 50. 64-page catalog on the Hollup line of electrodes and oxy-acetylene welding rods for mild steel, alloy steels, stainless steels, hard-facing and cast iron. Color identification, specification conformed to, physical properties, welding procedure, recommended ranges and sizes are included for each electrode. There are also tables on the weldability of metals, appearance inspection of welds, electrode-consumption estimating, definitions of welding terms.

30 COATED ABRASIVES—Clover Mfg. Co., Norwalk, Conn. 8-page bulletin No. 5 describes the effects of moisture on the work value of glue-bonded abrasives and answers problems in the correct use of coated abrasives. It also lists the critical moisture points and gives effects of humidity on the flexibility of such abrasives.

31 FLAME-CUTTING GUIDE—Universal Power Corp., Cleveland 15. 4-page catalog describes a new guide for manual flame-cutting right angles or scarfing 30-deg bevels. Illustrations also show how shape cuts can be made using this "Cut-O-Guide."

32 ALUMINUM ALLOY—Reynolds Metals, Co., Inc., Louisville 1. 4-page bulletin No. 55-B gives information on a new free-machining aluminum alloy. Alloy is available in two forms: forged stock supplied in the "as frabricated" condition and machine stock, solution-heat-treated and room-temperature-aged.

33 TIME SWITCHES—Automatic Temperature Control Co., Inc., Philadelphia 4. 4-page bulletin T-55 describes several types of time controls specially built for the volume user. Diagrams illustrate how timers were designed to meet six different manufacturing processes.

34 GRINDING WHEELS—Norton Company, Worcester, Mass. 108-page handbook on abrasives and grinding wheels. Detailed information is included for weld grinding steel boiler plate. Data are given on abrasive grain size, grade, structure, number and bond; types and sizes of grinding wheels, etc.

35 OXYGEN INDICATOR—Mine Safety Appliances Co., Pittsburgh 8. 4-page bulletin No. DW-3 covers the Type-C oxygen indicator used for measuring the content of inert and combustible atmospheres in the chemical, metallurgical and petroleum industries.

36 R-W ELECTRODES—Ampco Metal, Inc., Milwaukee 4. Bulletin 68A lists an extensive line of spot-welder tips, seam-welder wheels, electrode holders, adapters and projection dies.

37 MOTOR CONTROL—Yarde Laboratories, Inc., New York C 7. 6-page bulletin tells about a "pulsing drive" designed to control e tric motors in several different ways turning or depressing a single knob.

38 CHEMICAL CLEANER—Penn Mfg. Co., Philadelphia 7. Pa phlet gives complete details on a new ac type chemical cleaner for metals. S gests methods for removing boiled oi general pickling operations, cleaning heat-transfer equipment and stripping z plate.

39 WIRE STRIPPER—Holub Ind tries, Inc., Sycamore, Ill. 2-page b letin describes an automatic wire strip for insulated wires ranging from a f No. 22 up to and including No. 10. T text also covers standard and moto driven model strippers.

40 STEEL LIFTING—Boyer-Cam bell Co., Detroit 2. 4-page catal describes a new cam-lever mechanism a chain called the "Granny-Grip" that gra up heavily laden steel barrels, steel plat etc., and holds it in a vicelike grip witho teeth that tightens as the load increase

41 STEEL TRAILER CATALOG—Freuhauf Trailer Co., Detroit 3 16-page catalog describes the new Fre hauf line of all-welded stainless-ste trailers. Improvements in body co struction and mechanical features a covered in detail.

42 APPRENTICE PROGRAM—A prentice-Training Service, U. Department of Labor, Washington 2 D. C. 30-page booklet explains the va ious provisions to include in a program f training veterans in the skilled trades. contains a complete list of State agenci designated to approve business establis ments and educational institutions und the "G. I. Bill."

43 CASTINGS—Meehanite Meta Corp., New Rochelle, N. Y. 4-pag bulletin No. 23, "Meehanite—the Met for Permanent Molds," describes and il lustrates Meehanite permanent molds f metals and other materials.

44 PRECISION MACHINES—O'Neil-Irwin Mfg. Co., Minneapoli 15. 40-page catalog features the "D Arco" system which eliminates the nee for new dies in manufacturing. Clearly illustrated is the operation of binder shears and brakes.

45 TOOL FIXTURES—George Scher Co., Inc., New York City 12 4-page pamphlet depicts the use of a ne tool fixture designed for the precisio grinding of lathe tools, etc.

46 ROTARY PUMPS—Allis-Cha mers Mfg. Co., Milwaukee. 16-pag booklet describes the fundamentals o turbo-blowers, rotary compressors an vacuum pumps.

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A FREE ECONOMY IS WORTH FIGHTING FOR

BUSINESS must take the initiative if the price decontrol machinery, set up by Congress, is to be effective. The present price control law is far more than a set of instructions to the administrators of OPA; it is a challenge to business to be aggressive in speeding decontrol decisions and in persuading the Price Decontrol Board to adopt a strong stand for return to a free economy.

Thus far business has not met this challenge. *Two months after the passage of the new price law not a single application for decontrol of a major product had been filed by an industry advisory committee.* This is due in part to the red tape controlling such applications. Nonetheless, a continuation of such inactivity on the part of business can well result in perpetuating price control far beyond the time either the present law or sensible economic policy require.

It was the clear intent of Congress to hasten our return to a free economy. In the legislation continuing the general control of prices, Congress formally declared its purpose to have it "terminated as rapidly as possible."

To accomplish this, the House originally approved a formula which would have made decontrol mandatory when production had attained a prescribed level. The automatic decontrol provision was dropped before the bill was finally passed, partly because of the uncertain effects of strikes on production. But Congress did not mean to return the timing and extent of decontrol to the administrative discretion of OPA.

On the contrary, to assure having price control "terminated as rapidly as possible," Congress created a Price Decontrol Board and gave it power to overrule OPA when the board finds price control should be removed. Moreover, it gave to industry the right and the responsibility to seek decontrol. Also, in a further effort to speed up the decontrol process, it placed narrow limits on the time allowed for board decisions.

Congress had compelling economic reasons for doing its legislative best to speed up decontrol.

1. It is by all odds the best way to eliminate the bottlenecks in production and the black markets which have plagued the country since V-J Day.

   Rigid price ceilings promote shortages of badly needed commodities by discouraging their production. Such shortages both upset the flow of production and promote black markets. At present a considerable part of American industry is stymied by shortage of critical parts and materials. Price control is much to blame.

2. There must be flexibility of prices if a round of new wage adjustments, which may be forced on industry early in 1947, is to be negotiated without grave risks of seriously curtailing production.

   When, under the leadership of the national administration, the first post V-J Day round of wage adjustments was made, price ceilings were held rigid while wages were boosted. The result was a series of price-wage squeezes which upset production. They would have been disastrous if we had not been in a sellers' market, created by a tremendous accumulation of wartime shortages. In 1947, however, many industries will be in a buyers' market. It must be possible, therefore, to have wage increases reflected promptly in price adjustments if we are to avoid a repetition of the costly post V-J Day round of strikes, which often had price control as the key issue.

3. Rapid decontrol is necessary to maintain a high level of employment and production.

   Almost five years of price control inevitably twisted the factors of production and distribution far out of the equilibrium which would prevail in a free economy to which it is the clear purpose of the nation to return. Unless the return to a free economy is facilitated by a speedy and orderly decontrol, the jolt of an abrupt return to competition can be expected to upset employment and production seriously.

It's Up To Business

To encourage speed and boldness in decontrol, Congress provided for the reimposition of control over any prices which, after being released, might

get out of hand. The dangers of this sort are chronically exaggerated. During the 25-day period in July when there was no price control the Civilian Production Administration found that "manufacturers of finished industrial and consumer products have generally exhibited commendable restraint in increasing prices no more than increased costs."

All of this endeavor to speed up decontrol and expand its scope is likely to be futile, however, unless business furnishes the driving power for the machinery Congress provided. OPA certainly will not do it. Neither can the Decontrol Board be expected to go out and drum up cases.

The necessity for vigorous action by business in pressing for decontrol is increased by the fact that the general legislative standards to guide decisions by the Decontrol Board are vague. They must be clarified and sharpened by decisions in specific cases.

The main principle to guide the decontrol of non-agricultural products is that price ceilings shall be removed when supply is in approximate balance with demand. But what precisely does that mean? The meaning will become clear only through Decontrol Board decisions.

The same is true of the principle which makes automatic decontrol of a non-agricultural commodity contingent on whether or not it "is important to business costs or living costs." Business must press cases which will give specific meaning to those vague terms if decontrol is to get on apace.

Cards Are Stacked

At present the government has the cards pretty well stacked against rapid decontrol.

First, the key members of the staff of the Price Decontrol Board are holdovers from the Bowles regime which emphasized the importance of carrying on price control rather than speed in getting rid of it.

Second, in exercising his authority to prescribe regulations to govern petitions for decontrol, the OPA administrator has required excessively complicated statistical and economic data. Manufacturers who are sure they can convince any fair-minded board of the desirability of decontrolling certain of their products assert that they are blocked by statistical entanglements.

Third, OPA has discouraged business from moving immediately under one section of the law to speed decontrol. This section provides that products "not important in relation to business or living costs" may be freed from price ceilings immediately and must be freed by December 31, 1946, unles OPA specifically finds they are important to these costs. Instead of making it possible for business to move under this section now, OPA has issued rules which have the effect of blocking such a course until the end of the year.

In the light of obstacles such as these, it is not surprising that the record of decontrol to date is not impressive.

Decontrol Record

Since June 30 there has been a drop from about 70% to about 60% in the total value of products under price control. But most of the drop has been accounted for by food products, which Congress took the lead in decontrolling, and by industrial machinery which was being decontrolled when Congress acted. By far the larger part of manufactured consumer goods remains under control.

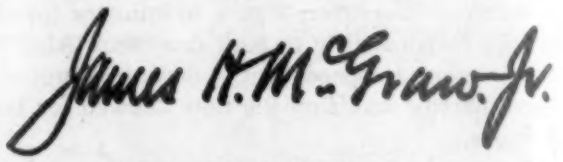
This, however, is no time for business to be discouraged. Rather, business should accept the obstacles put in its way as a challenge and work harder than ever for speedy decontrol.

The case for decontrol should not be stated in narrow technical terms. It should be based on grounds of broad public policy, and should demonstrate how a speedy return to a free economy can hasten the full release of the nation's productive power.

For example, there should be very clear demonstrations of how, in far too many cases, rigid price ceilings—(1) discourage production of key parts and materials by making such production relatively unprofitable, (2) create shortages of key parts and materials which tie up broad ranges of production or result in piling up lopsided inventories of partially completed goods, and (3) thus cut away the foundations of a stable economy and the prospects of steadily sustained employment.

There should be equally full demonstrations of the well known sequence from shortages to unrealistic price ceilings to black markets. Meat prices are rolled back, but the meat is rolled under the counter.

A free economy is worth fighting for. Liberty is preserved only by the constant struggle of those who believe in it. Neither the interests of the nation in a strong and well-balanced economy nor the interests of business itself will be served by drifting at this time. Now is the time for business to lead a strong offensive for speedy elimination of price control.



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Rough machined, or finished as desired. Wide range of sizes — 1¼" dia. x ¼" thickness to 30" dia. x 2" thickness. Centrifugally cast or cut from billets.

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Two combinations of high conductivity alloys are available; Ampcoloy 86-20 bushings and Ampcoloy 97 shafts where hardness and long life are essential; Ampcoloy 95 bushings and Ampcoloy 97 shafts where high conductivity and nominally good hardness are essential; also available of Ampco Metal.

Flash, Butt, and Projection Welding Dies

These units are made to your specifications and meet most exacting requirements of hardness and electrical conductivity.

Submit your problems to us . . . helpful engineering advice is available.

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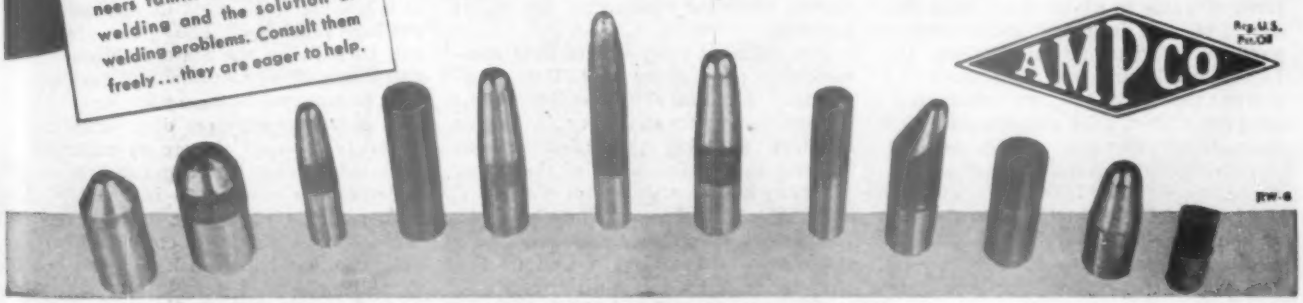
Engineering Service

At your service in Milwaukee is a group of highly skilled engineers familiar with resistance welding and the solution of welding problems. Consult them freely . . . they are eager to help.

AMPCO Reg U.S. Pat. Off



RW-6

News of the Industry

AWS Meets Nov. 17-22 at Atlantic City

Some 80 technical papers are scheduled to be presented at the 27th annual meeting of the American Welding Society, to be held at the Hotel Ambassador, Atlantic City N.J., November 17 to 22, inclusive. The total includes 11 papers on welding research, 13 on resistance welding, 4 on pressure welding, 7 on cutting, 3 on weldability, 3 on railroad applications, 3 on electrodes, 4 on production welding, 3 on pressure vessels and storage tanks, 3 on machinery, 3 on shipbuilding, 4 on aircraft, 3 on structural welding, 4 on hard-facing and 3 on high alloys. Nine more papers will cover a variety of other subjects such as the arc welding of cast iron with nickel electrodes, flame-hardening, plant maintenance, etc.

The president's reception for members and guests of the Society will be held on Sunday evening, Nov. 17, from 5 to 7. Monday begins the technical sessions, of which there will be 24, covering 15 divisions of the welding field. Other features of the convention are the annual dinner on Nov. 21, the Adams Lecture on Monday evening, Nov. 18 (to be given by Dr. Wendell F. Hess, Rensselaer Polytechnic Institute), the university research conference on Tuesday evening, Nov. 19, and the annual dinner of the AWS section officers on Wednesday Nov. 20.

* *

Buys 2,000,000-Volt X-ray Unit for Weld Inspection

The Babcock & Wilcox Co., Barberton, O., has purchased from the General X-Ray Corp. a 2,000,000-volt X-ray machine to be used for the examination of welds in pressure vessels up to 13 ft in diameter and 75 ft long. The cost of the equipment, together with a special building to house it, will be $150,000. Although the new apparatus is capable of operating at anywhere from 1,000,000 to 2,000,000 volts, it will be used principally at the higher voltages to take pictures of welds in plates 4 in. thick and over. It will produce much clearer pictures in that thickness than the 1,000,000-volt unit and will halve the average time needed to take radiographs. Steel plate 10 in. thick can be penetrated successfully while the practicable limit of the 1,000,000-volt machine is 6 or 7 in.

The specially designed building will be 35 ft wide, 31 ft high and 81 ft long. Its double wall consists of 42 in. of sand solidly packed between quarter-inch steel plates to prevent radiation from leaking outside. An overhead crane will support and move the 6,000-lb unit, which measures 5 ft in diameter by 12 ft 6 in. long. Two cars with drum turners will bring the welded pressure vessels into the building.

* *

WAA to Sell Surplus Resistance Welders

The War Assets Administration recently advised the welding industry that more than 1,900 resistance welders costing $10,000,000 new have been turned over to its 14 regional offices for disposal. This, says WAA, is only the start, for undoubtedly more such equipment will be declared surplus by agencies which acquired it during the war.

Manufacturers meeting with WAA officials to discuss plans for speeding up the disposal of surplus resistance welders, spare parts and controls were of the opinion that the job could best be accomplished through manufacturers of the equipment concerned, provided that sufficient profit is allowed to make the disposal worth the manufacturer's while. WAA was advised that many of the machines are highly specialized and have no peacetime uses. It was urged that such machines be sold on a sealed-bid basis in order that their valuable component parts might be recovered.

* *

German Solder Withstands Gas-Turbine Temperatures

A German silver-magnesium solder said to be capable of withstanding temperatures inside gas-turbines is discussed in a seven-page report written by P. R. Vogt and H. A. Huebotter for the U.S. Naval Technical Mission in Europe. This solder was used to attach the hollow blades of the Junker's 004 jet engine to the turbine wheel. Possible uses for it in America may be found in the fabrication of stainless-steel heat exchangers, exhaust manifolds, gas-turbine parts and general chemical equipment, the report suggests.

The solder is composed of 85% commercially pure silver and 15% magnesium. Addition of magnesium in this proportion to pure silver is said to give excellent soldering properties without lowering the melting point of the silver. The alloy has a melting point of 1,790 F and retains its high strength up to 850 F. The report describes the manufacture and use of the solder as well as the composition of the fluxes with it.

Orders for this report (PB-23086; photostat, $1; microfilm, 50¢) should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D.C., accompanied by check or money order payable to the Treasurer of the United States.

* *

Welding Engineer Goes to Small Page Size

The Welding Engineer and all other McGraw-Hill magazines, with the exception of *Business Week*, *Electrical Merchandising* and *Science Illustrated*, are adopting a standard 8¼ by 11¼ in. page size. We regret that the paper shortage makes this change necessary in the course of the year. We should have preferred, for your convenience if you bind the year's issues, that the change be made in January. However, your binder will, we are sure, be as willing and able to meet the situation as ours is. The issues September through December can be filled in at the stitching edge so as to equal the remainder of the year in width. The top and bottom margins of the first eight months are sufficiently wide to allow for trimming to the new length. We anticipate that this temporary inconvenience will be more than equalized by the advantage of a standardized size henceforth.

* *

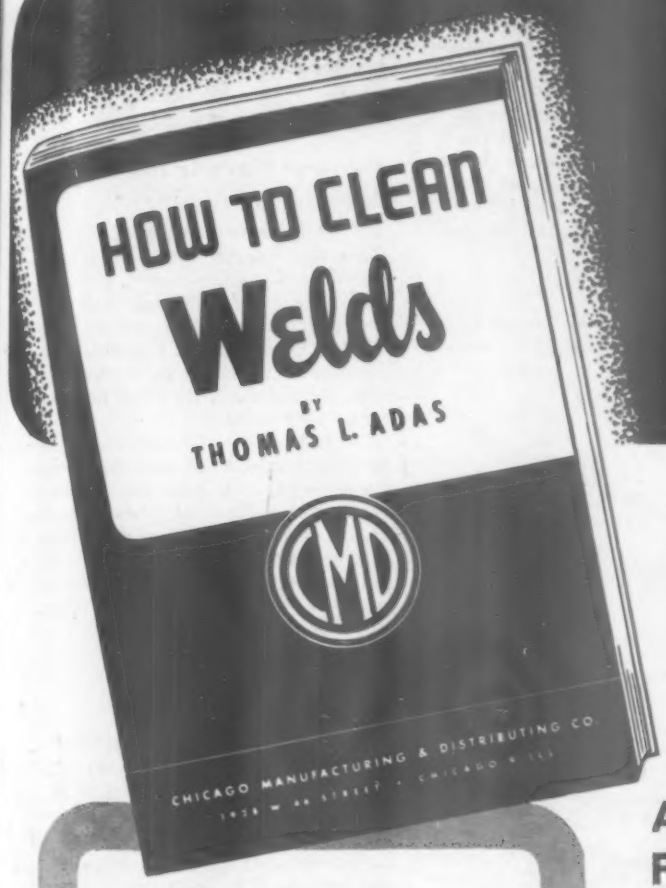
Lyon "Horse-Trades" to Get Steel

Lyon Metal Products, Inc., Aurora, Ill., sheet-metal manufacturer, has tackled the problem of securing hard-to-get sheet steel by employing the early American custom of "barter and exchange." In its "swap offer" Lyon includes finished products in two categories: (1) the customer in exchange for steel may select any one or more of the company's standard products in current production such as steel shelving, lockers, shop equipment, kitchen cabinets, filing cabinets, conveyors, etc. for the steel he furnishes; (2) special products are made to the customer's specifications . . . if in satisfactory quantities to form production runs.

* *

Machines Co. Builds Iron Powder Plant

A modern plant is being built on the Mesabi range of northern Minnesota for the conversion of iron carbonate slate into pure iron powder, a product which is beginning to be used in welding and cutting processes. The plant, which will be built by the State of Minnesota and operated by Continental Machines, Inc., is expected to have a capacity of 5 tons of iron powder per day. The iron is dissolved out of the ore by acid, precipitated as crystals of iron sulphate and preferentially roasted to iron oxide of high purity. The oxide is then produced to iron powder of controlled physical characteristics with a purity of over 99%.



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"How to Clean Welds" will help you teach apprentices the *right methods first,* and give experienced weldors welcome suggestions on short-cuts that save their time. It will help you prevent mistakes that waste metal and require rewelding and consequent delays. Send for a copy today!

16 DATA-PACKED PAGES *On All Phases of Weld Cleaning*

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4. **Tests of a Clean Weld.** Visual, chemical.
5. **Cleaning Before, During, and After Welding.** New and old techniques.
6. **Effect of Rust, Oil, and Dirt on Welds.** Importance of pre-weld cleaning.
7. **Cleaning Subsequent Beads, Fillets, Grooves.** The right way to handle these operations to thoroughly remove slag.

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Alloy Research Helps Make Synthetic Rubber

UNDER the supervision of H. D. Newell, chief metallurgist, The Babcock & Wilcox Tube Co., extensive research has been carried out on the properties, behavior and weldability of 27%-chromium-iron and other high-alloy materials for the purpose of improving equipment for making synthetic rubber. These studies were made under contract for the Rubber Reserve Co. (now the Reconstruction Finance Corp., Office of Rubber Reserve) and were intended primarily for manufacturers of raw materials for synthetic rubber. Thirty metallurgical reports have been submitted to various oil companies and operators in the rubber program.

For welding the 27%-chromium-iron tubing, Mr. Newell suggests use of a nickel-bearing austenitic or partially austenitic electrode, preheating before welding, stress relieving at 1,300 F immediately afterwards, followed by rapid cooling. Other recommendations concerned welding repairs, avoidance of sharp notches, elimination of shock stresses, elimination of 885 F embrittlement and heat treatment to remove the sigma phase. The latter is a brittle intermetallic iron-chromium compound which forms in alloys containing more than about 25% chromium on extended heating in the range from 950–1,250 F.

* *

General Electric Runs Atomic-Energy Plant

UNDER its agreement with the government for research and development in the field of atomic energy, the chemical department of General Electric Co. recently took over the operation of the $347,000,000 Hanford Engineer Works at Richland, Washington, formerly operated by the E. I. du Pont de Nemours and Co.

William H. Milton, Jr., assistant general manager of the G-E chemical department, will continue as administrator of the Hanford Works and David H. Lauder, assistant manager of the service engineering division of the apparatus department, has been appointed manager of the atomic-energy plant.

* *

Offer Royalty-Free Use of German-Owned Patents

AN accord was reached in London recently by representatives of 12 nations, that former German patents may be licensed on a non-exclusive, royalty-free basis to citizens of other countries signing the accord. The agreement is open to members of the United Nations and to any neutral country. The United States, United Kingdom, France and Netherlands have signed it. The delegates from Australia, Canada, Czechoslovakia and the Union of South Africa have recommended that their governments sign.

In the various countries, more than 100,000 formerly wholly-owned German patents will be affected by the accord. James E. Markam, U.S Alien Property Custodian, will continue to administer and license the German patents seized by the United States.

* *

New Firm Plans $100,000 Oxy-acetylene Plant

Welding Supplies, Inc., affiliate of the C. W. Farmer Co., wholesale mill supply firm of Macon, Ga., plans the construction of a $100,000 plant for the manufacture of oxygen and acetylene. Two officers of the new welding firm are: C. W. Farmer, president; L. H. Reavis, vice-president and general manager; J. H. Leigh, secretary and treasurer.

* *

Pressure Weld Co. Moves

IN order to facilitate operations on the El Paso Natural Gas Co. pipe line from West Texas to California, the Pressure Weld Co., Houston, Tex., has moved its office from 421 Niels Esperson Bldg. to the El Paso National Bank Bldg., El Paso.

FOR *ALL* PRODUCTION And MAINTENANCE JOBS

Marquette A. C. Arc Welders take all production and maintenance welding jobs in stride from light gauge sheet metal to heavy steel beams. Marquette's newly designed transformer gives you "Instant Arc Striking" thru the entire welding range . . . without the use of high frequency or booster gadgets. Light gauge sheet metal welding is smoother and faster because it is so easy to strike and hold the arc. On heavy welding jobs the Automatic Voltage Control assures the best arc and reduces spatter on high heats.

Model 262 C has built-in Capacitor for High Power Factor. Generous use of aluminum alloys increase transformer efficiency. Telnic Bronze plugs and sockets double current carrying capacity in high heat stages. Models: 262 and 262 C, 20–275 amps.; 261 and 261 C, 20–200 amps. Write for literature.

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Welding EQUIPMENT
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Can You Pick THE RIGHT ELECTRODE?

YES, IT'S EASY because you purchase Allis-Chalmers electrodes according to *American Welding Society* number. They're easy to remember and easy to buy!

Trade names and numbering codes as used by numerous electrode manufacturers have created puzzling situations. One standard rod, for example, has over *twenty* different trade names — with no two names even vaguely similar.

But Allis-Chalmers electrodes are made and sold according to definite AWS standards . . . and every electrode is assigned its *official* AWS classification number.

Used by the ton every day in A-C's own huge plants these electrodes are constantly research-tested and production-proved. They *have* to be good! Ask for them at our nearby welder dealer or A-C sales office.

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Headquarters for all arc welding equipment.
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Tests Show Oxygen Boosts Steel Output

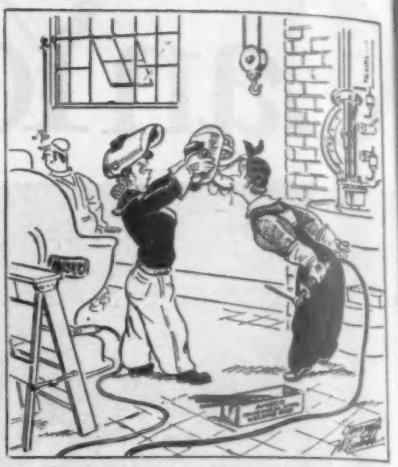
LARGE scale tests were recently conducted in a 150-ton furnace at the Hamilton Ontario, plant of the Steel Company of Canada to demonstrate the possibility of using oxygen to obtain a greater steel production. The oxygen was introduced into the furnace in a novel way and produced a controlled flame which was directed at the furnace charge during the melt-down period. It had no apparent effect on the furnace lining.

Among those active in conducting the test program were: E. T. W. Bailey, combustion engineer, Steel Company of Canada; Frank G. Kerry, manager of the development and engineering department of the Canadian Liquid Air Co., Ltd.; and G. V. Slottman, manager of the technical sales division, Air Reduction Sales Co.

* *

Lukens Appoints New Representative

ROBERT DUENNER & Co. has been named sales representative in Tulsa, Oklahoma, for Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc. The Duenner organization will represent the three companies in Oklahoma, Kansas, Colorado and in Missouri, west of State Highway 65.



Courtesy, American Manganese Steel Division

"When you're working at this job, Gloria, you can't chew bubble-gum."

"Nicloy" Trade Mark for Nickel-Steel Tubing

THE trade-mark "Nicloy" has been accepted for registration by the U.S. Patent Office for the straight nickel-steel tubing developed by the metallurgical laboratory of The Babcock & Wilcox Tube Co., at Beaver Falls, Pa. At present, three Nicloy seamless tubings are available: Nicloy 3½, 5 and 9. The 3½ and 5% nickel steels offer resistance to certain types of corrosion in alkaline media and resistance to embrittlement at sub-zero temperatures. The 9% alloy was developed primarily for pressure tubing in plants handling liquefied gas or other low-temperature fluids. It is said to exhibit good physical properties at temperatures as low as −320 F.

* *

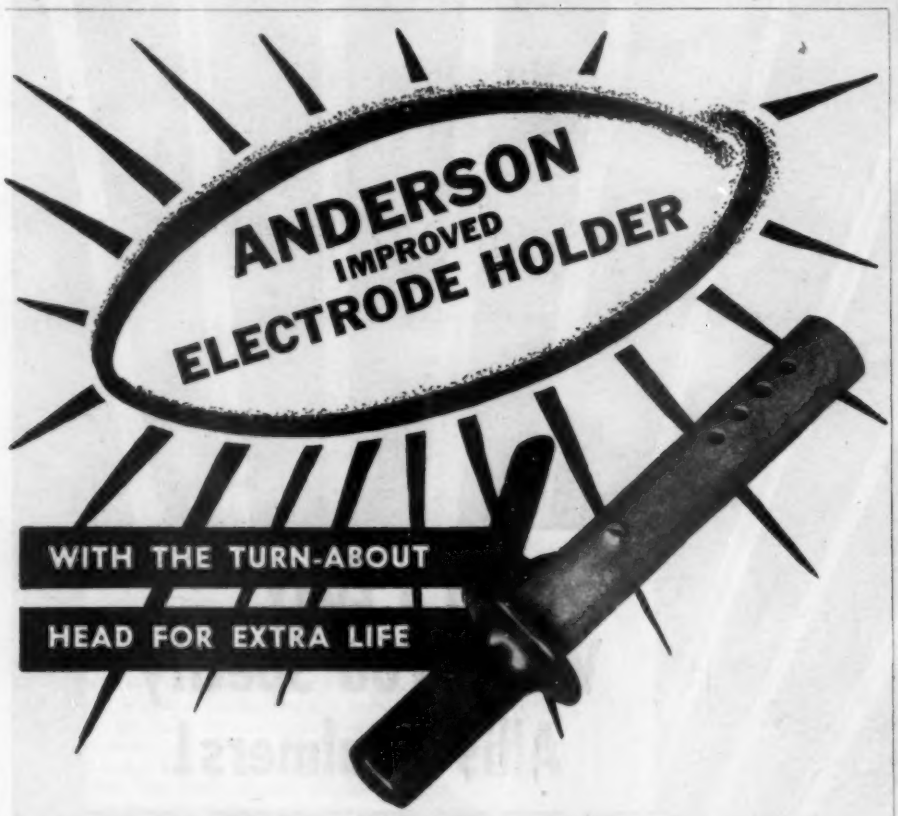
AIEE Sets up Standards for Resistance-Welding Control

AT a recent meeting of the American Institute of Electrical Engineers, a series of standards pertaining to resistance-welding controls were set up and recommended. The recommended standards cover such products as: magnetic welding contactors, electronic welding contactors, electronic heat controls, timers, sequence timers, synchronous precision timers and control circuits. In addition, the AIEE adopted definitions for resistance-welding methods, equipment and controls.

* *

To Install Gas Plant at Albany, Georgia

A CONTRACT has been awarded to Stacey Dresser Engineering, division of Stacey Bros. Gas Construction Co., Cincinnati, for the design and installation of a propane-air gas plant at Albany, Georgia. The plant will produce 312,000 standard cubic ft per day of 550 Btu propane-air gas and will be capable of meeting variable peak winter load requirements. Complete liquefied-propane storage facilities will also be provided.



The new ANDERSON Light-Weight Electrode Holder with the cool handle leads a double life. A single screw is loosened to allow reversal of the insulated head — the head lasts twice as long . . . expense of replacement is cut in half.

A vise-jaw grip, fully protected from spatter, firmly holds up to ¼ inch electrodes. Good balance and a weight of only one pound is achieved by simplicity of construction and a minimum number of parts. A single screw holds it together. Don't let inferior equipment slow you down . . . insist on ANDERSON.

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Government to Sell Surplus Metal

To help relieve the acute shortage of metals and metallic scrap, upwards of 75 million dollars' worth of government-owned surplus materials will be made available soon for reconversion in an accelerated sales program put into effect by the War Assets Administration. The fixed-price method will prevail in the disposal of this property except for the following, which will be sold on a sealed-bid basis: aluminum scrap, including castings, forgings and rivets; tool steel, other than standard items definitely identified by trade name.

Among the major WAA regional offices offering this material for sale are New York, Philadelphia, Chicago, Boston, Detroit and Cleveland.

* *

Preference Rating Restored on Iron Castings and Steel

THE Civilian Production Administration recently announced restoration of the normal operation of the CC preference rating system on iron castings and steel, which rating had been suspended at the time of the steel strike. Manufacturers are now eligible to get CC ratings that will speed their procurement of iron castings and steel.

Steel ingot output is approaching a 90% capacity rate, and it is expected that the output of finished steel in the fourth quarter may reach normal, or between 13.5 and 14 million tons.

* *

Glenn-Roberts Moves

THE Glenn-Roberts Co., manufacturer of a-c welders and other welding equipment, has moved its general offices from Oakland, Calif., to Indianapolis. The new G-R address will be at the old F. E. Gates Marble & Tile Co. building, 2107 Adams Street, Indianapolis. Fifty workers are now employed at the new plant, and the company's expansion plans for the next year call for a payroll increase to more than double this figure.

* *

Ryan Installs Cell for Jet Research

A steel-reinforced, concrete cell designed for testing jet-propulsion and gas-turbine engines has been completed at the Lindbergh Field plant of the Ryan Aeronautical Co., San Diego. The new test house has been equipped with all the instrumentation necessary to measure jet-engine performance, thrust and fuel consumption and to run complete ground tests of jet power plants.

* *

SESA to Meet Dec. 9 to 11

THE annual meeting of the Society for Experimental Stress Analysis will be held at the Hotel New Yorker, New York City, December 9, 10 and 11. Inquiries should be addressed to the Society at P.O. Box 168, Cambridge 39.

More Protection

Less Eyestrain

Increased Production

Photo—courtesy Lincoln Electric Co.

with Bausch & Lomb Welding Glass

Bausch & Lomb Welding Glass is available in a range of 12 densities, conforming to government specifications.

Real protection, but lightweight—cool and comfortable, too—Bausch & Lomb Welding Goggles with lenses of genuine B&L Welding Glass.

For reduced accident rate, increased production, improved quality, less labor turnover, lower training costs, investigate the Bausch & Lomb Industrial Vision Service. Write for "Vision in Industry" (booklet No. A-391).

A safe margin of eye protection against infra-red, ultra-violet, and glare is your first consideration in choosing a welding glass. But beyond this, look for fine optical quality, to eliminate eyestrain, and to obtain high quality production at lowered costs. Specify Bausch & Lomb Welding Glass in helmets, hand shields, and goggles. Bausch & Lomb Optical Co., 754-10 St. Paul Street, Rochester 2, New York.

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High Yield ? yes
Uniformity ? yes

A tested carbide . . . meeting International and Federal specifications . . . generating acetylene in 12 countries. Standard sizes, in 100-lb. and 500-lb. drums. Location of our plant at Portland, Oregon, permits low-cost delivery to all deep water ports. Address:

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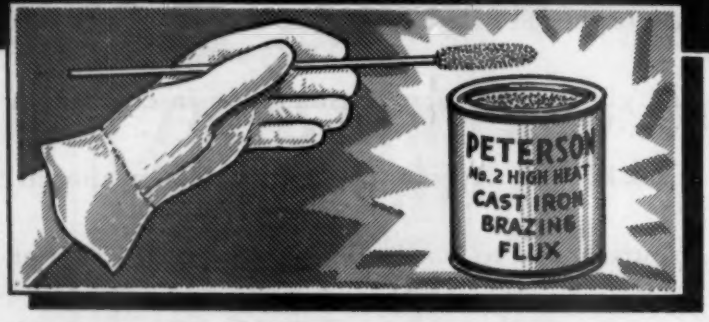
"FLUXES OF MERIT"



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OPA Suspends Controls on Some Welding Work

ACCORDING to a recent release by the Office of Price Administration, effective Sept. 15, 1946, any job shop operation formerly covered by the agency's industrial services regulation (Maximum Price Regulation 581) is suspended from price control unless it consists "entirely or principally" of welding cutting, forming, grinding, machining, assembling or shaping. The word "principally" as it applies in this sense means that more than 50% of the total operation's cost based on the seller's June 30, 1946, maximum price. Thus an operation involving welding (or any combination of the above named services) in an amount less than 50% of the value of the whole job is entirely freed from OPA control.

All repair and maintenance services under the industrial service regulation, regardless of the nature of the work, are also suspended.

* *

Scrap Shortage Impedes Steel Production

A survey of several large steel producers conducted by the Iron and Steel Scrap Committee of the AISI shows that receipts of scrap have been below requirements and hence maximum steel production is impossible. The unsatisfactory flow of scrap is depriving the nation of steel that it could well use for additional homes, automobiles and farm equipment, the Committee declared. The majority of steel plants were found to have less than a month's supply of scrap in their stockpiles, some as little as one week's supply.

* *

Handy & Harman Builds West Coast Plant

IN order to meet the increased demand for gold and silver products including brazing alloys of the Pacific coast, Handy & Harman, New York, is building a new plant in Los Angeles. The company established an office in that city in 1943 to warehouse brazing products, etc., and this office will be moved to the new location at 3265 Medford Street when the new plant opens in the latter part of this year.

* *

Hydraulic Conference at Chicago Oct. 22–23

THE second annual meeting of the National Conference on Hydraulic Machinery will be held in Chicago on Tuesday and Wednesday, October 22 and 23, at the Hotel Continental, 505 North Michigan Ave. The conference is sponsored by two divisions of Illinois Institute of Technology, Armour Research Foundation and the Graduate School, with the coöperation of the Western Society of Engineers and local sections of the American Society of Civil Engineers, the American Society of Mechanical Engineers and the Society of Automotive Engineers.

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Gasweld Pressure Regulators

Dependable and accurate—that is the story of "Gasweld" Pressure Regulators which assure *an ample supply of gas at a constant, even pressure.* The man on the job appreciates the simple construction—plus long-life, trouble-free operation and ease of repair that are characteristics of all "Gasweld" equipment.

A new-type "soft-floating seat" works WITH—not against—the pressure . . . It handles large or small gas pressure without excessive gauge drop. "Gasweld" Pressure Regulators are precision built, extremely sensitive, capable of fine adjustment and maintain accurately any desired pressure.

Available models include those for heaviest cutting or light welding . . . made for use with Oxygen, Acetylene, Hydrogen—or Propane and other petroleum fuel gases.

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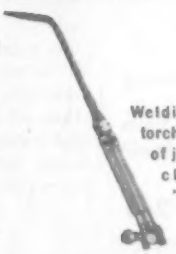
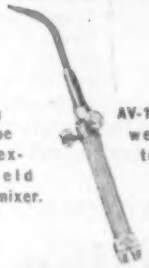
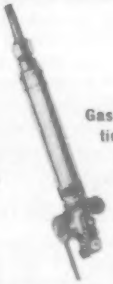
FULLY CONFORMING WITH STANDARDS OF UNDERWRITERS' LABORATORIES



Welding and cutting torches for every type of job. With the exclusive Gasweld "Free-Flow" mixer.



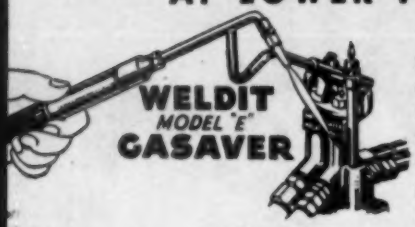
AV-10—Special lightweight AIRCRAFT torch for welding aluminum and light-gauge metals.



Gasweld Machine Cutting Torches are available for use with any flame cutting machine.

Safe Welding

AT LOWER PRODUCTION COSTS



The Weldit Gasaver shuts off the welding flame when not in use. . . . Conserves essential materials by cutting oxygen and acetylene consumption as much as *fifty* per cent. Prevents injury to workmen—or sudden fires—from dangerous idle torch flames. . . . Adjustment remains unaltered between welds.

When the Weldit Gasaver has been installed, you simply hang idle torch on the handy lever rod. Weight of torch pulls rod down, thus automatically shutting off supply lines. Relight instantly by passing torch over Gasaver pilot light. No bother. . . . No time lost. . . . *No readjusting required.*

Better Soldering, Annealing and Heating Jobs

The Weldit Model CW Blowpipe is in daily use by many foremost industrial plants. . . . Built in accordance with the recommendations of leading fabricators of sheet metal products. . . . Operates on either natural gas, manufactured gas, or other low temperature fuel gas and compressed air. Stands up under rough shop use. . . . Send for literature.

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- Straight Lines
- Cut Rings of large or small radii
- Make Flanges
- Joggles and Offsets
- Cut Odd Shapes
- Bevels, and angle
- Reverse Curves
- Beads, and U's
- Cut Holes, without cutting from edges

KLING Rotary Shears are built for endurance and long-time service. Moreover, skilled labor is not required in their operation.

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About People

HUGO HIEMKE has joined the Pacific Coast division of the A. O. Smith Corp. as assistant director of the company's service and development laboratory in Los Angeles. He will work on technical problems arising in the company's plant and in plants of two subsidiary concerns, the Sawyer Electrical Mfg. Co. and the Smith Meter Co.

* *

LORN CAMPBELL, JR., president of Harris Calorfic Co., who has been bothered by hay fever for many years, recently departed for South America, a more favorable climate for his affliction. He will combine business with his sojourn by calling upon company representatives in Puerto Rico, Venezuela, Brazil, Uruguay, Argentina, Chile, Peru, Colombia, Panama, Guatemala and Mexico.

* *

ALFRED E. KAYWORTH has been appointed sales representative for the Belden Mfg. Co. in the New England states. He will handle all of Belden's automotive, radio and electrical lines for merchandise outlets in Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island and New York. CHESTER J. FREY has been appointed sales representative for the Buffalo, Syracuse and Pittsburgh areas.

* *

K. P. SWANSON has been appointed representative for Progressive Welder Co. in eastern Connecticut, eastern Massachusetts, Rhode Island, Maine, Vermont and New Hampshire. Mr. Swanson joins V. A. CHERN and H. B. AXTELL in covering the New England area on the company's line of resistance-welding equipment.

* *

EDMUND T. PRICE was recently re-elected president of Solar Aircraft Co. for the 17th consecutive year. L. M. KLAUBER, vice-president and general manager of the San Diego Gas & Electric Co., was elected to the company's board of directors to succeed RUSSELL VOUGHT, resigned.

* *

RICHARD F. MULLER has been named manager of the New Orleans district office of the Allis-Chalmers Mfg. Co., succeeding F. W. STEVENS, who continues with the company as a special representative in this area.

* *

I. B. ANDERSON has been appointed manager of the stainless-steel division of the Jessop Steel Co.

J. DONALD ZAISER has been elected president and general manager of Ampco Metal, Inc., Milwaukee. He succeeds his father, the late C. J. ZAISER, who died on July 29. The new Ampco president has been associated with the company since 1933 when he joined Ampco's production department after graduating from Purdue University with a mechanical engineering degree.

* *

F. D. SMITH has been appointed assistant to the general manager of sales for Oil Well Supply Co., Dallas, Tex. JOHN E. MILLER also joins the Dallas office as machinery service manager of the general sales department. C. M. WITTUM has been named eastern division credit manager with offices in Columbus, O.

* *

WILLIAM J. NORMAN has been appointed district manager of the Waverly plant of U.S. Steel Supply Co., Newark. He succeeds Charles Kramer, who retires after 46 years of U.S. Steel service.

* *

GRANVILLE M. READ has been appointed chief engineer for E. I. du Pont de Nemours & Co. He succeeds EVERETT G. ACKART, who retires after 40 years with du Pont.

* *

BEN C. MYERS has been appointed resistance-welding engineer in charge of sales and service for the Big Three Welding Equipment Co., Taylor-Winfield representative in Texas, Oklahoma and New Mexico.

* *

EDWARD C. LOGELIN, JR., has been appointed director of public relations for United States Steel Corp. and subsidiaries in the Chicago district. He succeeds ARTHUR C. WILBY, who was elected vice-president.

* *

I. A. CRAWFORD has become vice-president in charge of operations for the Ex-Cell-O Steel Products Co., Detroit. Mr. Crawford has several years of experience as welding engineer, research development engineer and manufacturing engineer with such organizations as Chrysler, Westinghouse, Progressive Welder Co. and others.

* *

F. E. GARRIOTT, development manager for welding electrodes, has assumed the duties of manager of weldrod sales for Ampco Metal, Inc. Mr Garriott is responsible for development, production and sales of all arc welding electrodes. E. J. SORENSEN, formerly manager of weldrod sales, assumes the title of sales promotion manager.

* *

D. E. MCGUIRE, assistant to the general works manager for Great Lakes Steel Corp., has been appointed chief engineer.

choose electrodes on these "points"

. . . you'll choose *HOLD-ARK*

To know if an electrode is good, here's a tip-off: examine the working point it develops.

1 Hold-Ark Electrodes, made of the highest grade carbon, uniform in composition for high current carrying capacity, are designed for concentrating maximum heat at the welding point. Result—an even, stable arc for fast, quality work.

2 Hold-Ark Electrodes develop better, short-angle points that increase their useful life 33%. Result—since burning does not extend far back on the rod, spindling is prevented, and *all* the electrode is useable right down to the holder—produces 13% more welds per inch of rod.

3 Hold-Ark Electrodes are 22% stronger and harder too. Result—they withstand more shock and abuse on welding and cutting operations.

From every point of view, Hold-Ark Electrodes give faster, better, more economical arc welding and cutting by hand or automatic machine. Let a trial order prove these "good points" to you.

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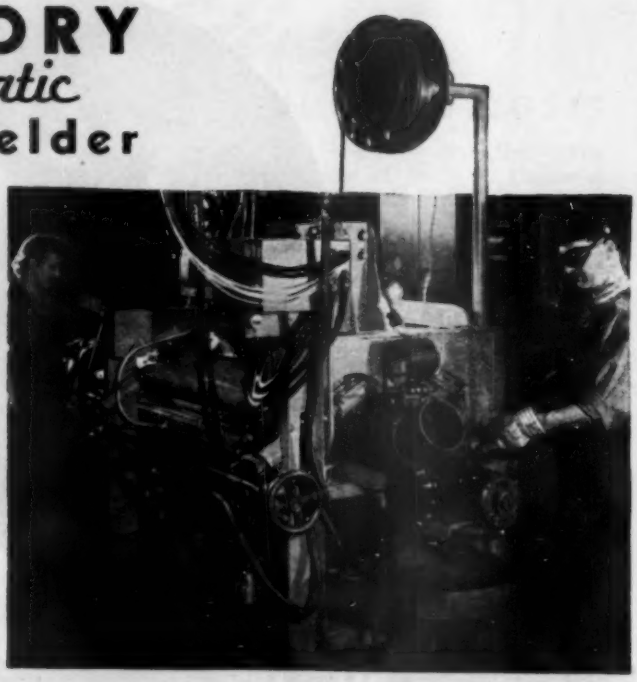
VICTORY *Automatic* Seam Welder



ACTUAL PHOTOGRAPH OF MODEL 0412 IN USE

Have you considered the opportunities which the VICTORY *Automatic* SEAM WELDER offers you for *low-cost, continuous* production of many types of seam-welded tubing? Century Electric Co., St. Louis, make seam-welded fractional horse-power motor frames at enormously increased rate with this Model 0412 VICTORY *Automatic* SEAM WELDER.

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GEORGE E. LAW has been appointed head of a new branch office in Appleton, Wis. for Reliance Electric & Engineering Co. M. J. SANDLING has been named to head a new office to be opened in Grand Rapids, Mich.

* *

FREDERICK C. ABBOTT has been named assistant production manager in the manufacturing department of the company. HUGH RICHARD BISHOP succeeds Mr. Abbott as manager of the new products division.

* *

R. J. RICE, metallurgical and chemical engineer for International Nickel Co., Inc., has been named to head the new Houston, Tex. technical section of the company's development and research division.

* *

HOWARD B. CAREY has joined the staff of Batelle Memorial Institute, Columbus, O., and will specialize in research pertaining to controlled-atmosphere welding and the welding of aircraft tubing.

* *

WARREN H. FARR, formerly vice-president of the former Budd Wheel Co., has been appointed vice-president in charge of manufacturing of The Budd Co., Philadelphia.

* *

GRAY L. FUREY has been appointed sales representative of the Titan Metal Mfg. Co. for Kentucky, southwestern Ohio and eastern Indiana. His offices are at 405 Union Centrel Bldg., Cincinnati.

* *

LEONARD T. BEALE, president of the Pennsylvania Salt Mfg. Co., and RICHARD L. DAVIES, assistant to the president of Pennsalt, have received from King Christian X of Denmark the King Christian X Medal of Liberation for their efforts toward the Danish cause during the years of Nazi occupation.

* *

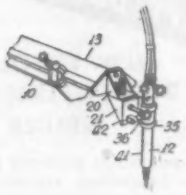
Died . . .

CARL J. ZAISER, formerly president of Ampco Metal, Inc., died at his home in Wauwatosa, Wis., on July 29. A former newspaper man, Mr. Zaiser became president and general manager of Ampco in 1919 when it was just a small foundry struggling to gain recognition for its aluminum-bronze alloy. Under his management the company grew until it employed 2,700 workers during the war. Mr. Zaiser was also a leader in civic affairs in Milwaukee and served as an officer of many business and charitable organizations.

* *

DR. A. R. STEVENSON, JR., staff assistant to General Electric's vice-president in charge of engineering policy, died recently at Ellis Hospital, Schenectady. Dr. Stevenson was assigned to matters of education and training of engineering personnel.

From the Patent Office



Flame-Cutting Machine

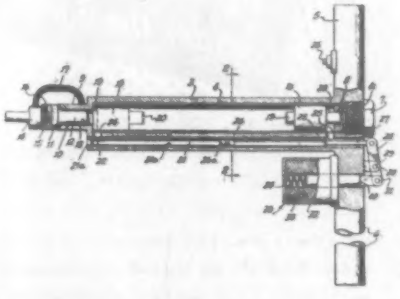
2,401,721. ALFRED F. CHOUINARD, Chicago, assigned to NATIONAL CYLINDER GAS Co., Chicago. Filed Sept. 29, 1943. Issued June 11, 1946.

A flame-cutting machine including a carriage and a torch-carrying device made of two members. One of the members has a hole and the other has a slot; a pivot bolt extending through both hole and slot. A spring encircles the bolt and resists but permits tilting of the second member away from a horizontal surface. A means engaging the bolt effects relative movement of the bolt and the member having the slot, along the length of the slot.

* *

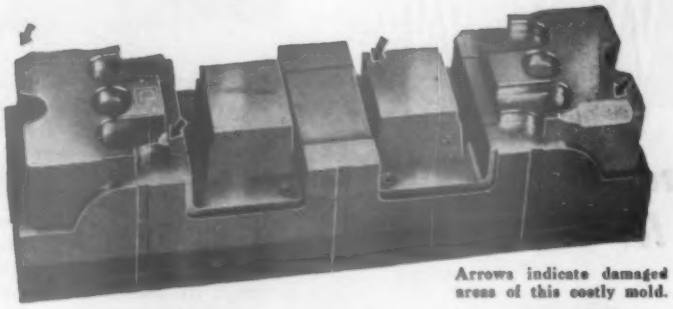
Pokeweld Gun

2,402,275. DONALD H. ESTES, Lincoln Acres, Calif., assigned to ROHR AIRCRAFT CORP., Chula Vista, Calif. Filed June 10, 1944. Issued June 18, 1946.



In a pokeweld gun, the combination of an electrode in the form of a barrel having an elongated enclosed passageway with inlet and outlet ports. A welding tip is secured to one end of the electrode. A piston is disposed to make close sliding contact with the passageway. A sliding valve is secured to the barrel for opening and closing the ports, and a solenoid is connected to control the valve and thus admit or expel air into or out of the passageway. Air pressure causes the piston to be driven along the passageway to effect striking impact upon the tip and thereafter to move away. A means is provided for controlling and temporarily energizing the solenoid.

Plastic mold saved by welding!



Arrows indicate damaged areas of this costly mold.

Eureka Hot Work Tool Steel Electrodes quickly repair the damage.

The costly mold illustrated above was saved at a small fraction of its replacement cost and was back into operation with only a minimum delay. Eureka Hot Work Tool Steel Electrodes did the job. "Hard-as-welded" deposits have excellent hot-working, air hardening characteristics. Approximate hardness is 50-40 Rockwell C.

Weld deposits resist abrasion; are exceptionally tough; will withstand erosive action; alternate heating and cooling without fire checking; will not scale excessively. *There is a Eureka Tool and Die Welding Electrode to meet every need.*

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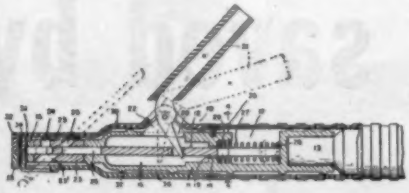
Chicago 12, Ill.

Electrode Holder

2,398,032. ROBERT MUNRO, Groose Pointe Woods, and ARTHUR A. ALBRIGHT, Detroit. Filed July 10, 1944. Issued April 9, 1946.



An electrode holder with a bifurcated end having registering openings through the furcations. Removable inserts supported in furcations have openings for receiving an electrode. A slide supported between the furcations has an opening registrable with the openings in the furcations to permit entrance of an electrode. A spring normally urges the slide in a direction to disalign its opening and the openings in the furcations.

* *

Automatic Welding Apparatus

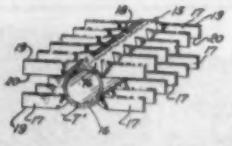
2,403,221. CECIL D. HOWARD, Swarthmore, Pa., assigned to SUN SHIPBUILDING & DRY DOCK CO., Chester, Pa. Filed May 7, 1941. Issued July 2, 1946.

In apparatus for the automatic butt welding of plates, a support for the abutting edge portions of a pair of plates, a trolley traveling longitudinally above the abutted edges, a pair of rollers with their longitudinal axes at right angles to the direction of travel of the trolley, and a pivoted means connecting the rollers respectively with the trolley and with a means to force the rollers against the adjacent edge portions of the plate to clamp them to the support. A welding device is supported from the trolley for operation between the rollers.

* *

Welded Finned Tube

2,400,737. JOHN W. BROWN, JR., Lakewood, O., assigned to BROWN FINTUBE CO., Eylria, O. Filed July 14, 1942. Issued May 21, 1946.



A heat exchanger tube having a pair of longitudinally finned members welded to it. Each finned member comprises an elongated base portion welded to the tube and two rows of spaced fins lying in planes parallel to each other and perpendicular to the axis of the tube. The longitudinal edges of the fins in each row are parallel to each other and lie in planes parallel to and spaced from the planes of the longitudinal edges of the fins in the other rows.

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I'm interested in learning how to become an expert arc welder—send details! I've checked applicable information below:
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Name
Address
City State

Brazed Cylinder Muff

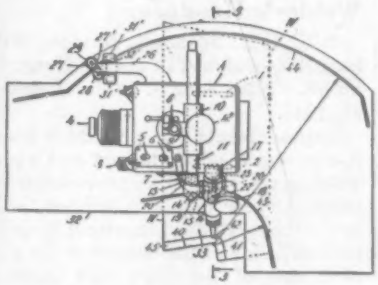
2,400,157. Arthur A. Merry, West Hartford, Conn., assigned to United Aircraft Corp., East Hartford, Conn., Filed Sept. 11, 1943. Issued May 14, 1946.

In an air-cooled cylinder for an internal-combustion engine, a heat-dissipating muff that is shrunk-fit on the cylinder barrel. The muff is made from a stack of alternately arranged fins and spacers having aligned apertures therein for receiving the cylinder barrel. The fins are formed of soft aluminum having a high coefficient of thermal conductivity, and the spacers are formed of harder aluminum alloy. The fins and spacers are brazed at their engaging surfaces to form a sleeve. The inner peripheral edges of both fins and spacers are flush and in direct pressure contact with the outer surface of the barrel, with equal pressure throughout the operating temperature range of the engine.

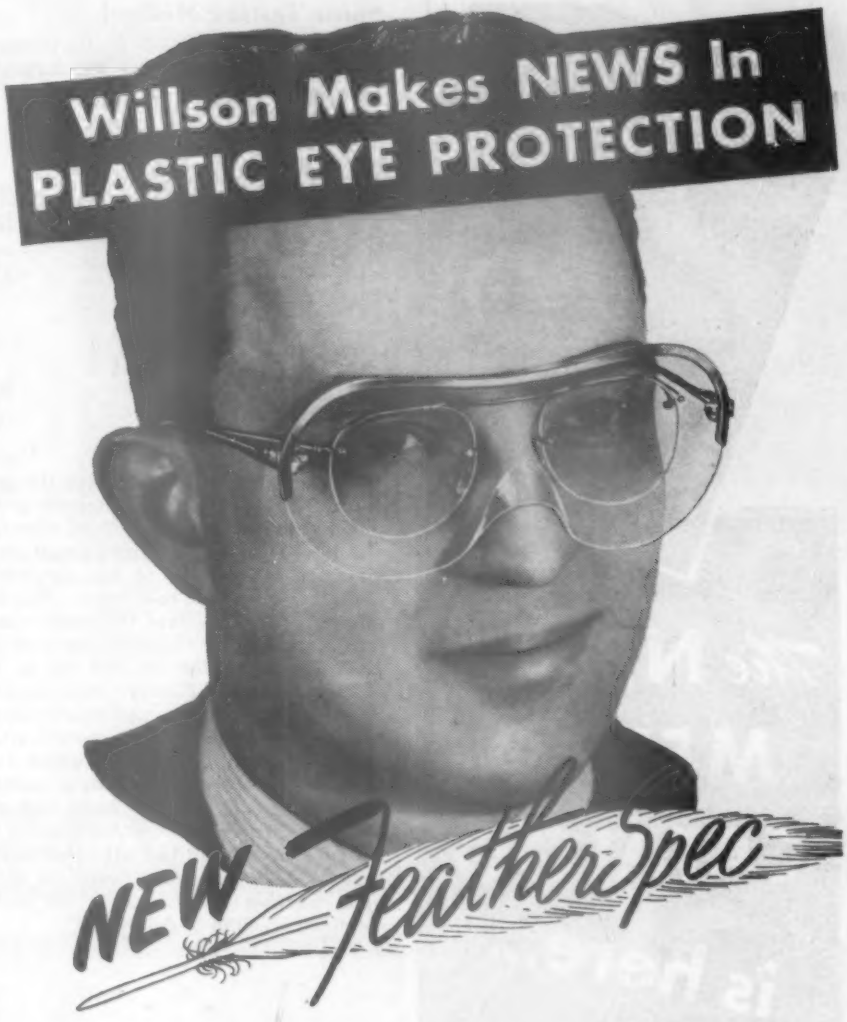
* *

Shape-Cutting Machine

2,403,514. James F. Franzen, Chicago, assigned to Air Reduction Co., Inc. Filed Sept. 10, 1943. Issued July 9, 1946.



A flame-cutting machine including a motor-driven carriage having a pair of forward wheels and at least one rear castor wheel. A torch arm mounted on the carriage carries a cutting torch at an angle to the surface of the workpiece in order to produce a bevel edge. The tip of the torch is substantially in transverse alignment with the contact points of the forward carriage wheels. The carriage may be made to move in a manner to cut a curved corner of relatively small radius; this is done by a means including a pair of guide rails between which the carriage is adapted to travel. Portions of the rails are curved about the center of the curved corner to be cut in the workpiece. An arm attached to the side of the carriage where the torch is located carries a pair of rollers engaging opposite vertical faces of the corresponding guide rail. A second arm attached to the opposite side of the carriage carries a pair of rollers engaging opposite vertical faces of the other guide rail.



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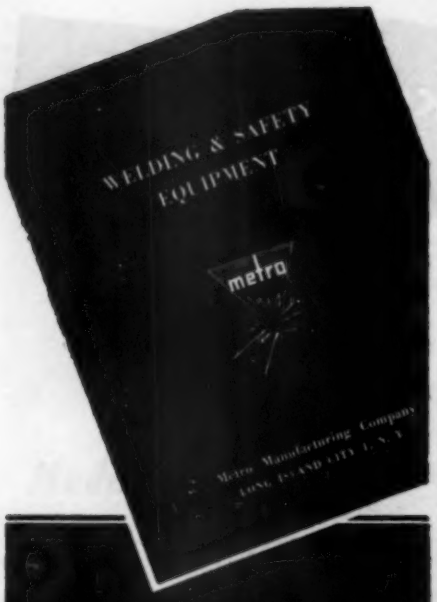

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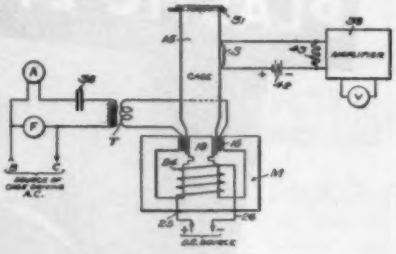
Sonic Testing Method

2,403,999. THOMAS A. READ, HERBERT I. FUSFELD and SUMNER W. KITCHEN, Philadelphia. Filed Feb. 22, 1944. Issued July 16, 1946.

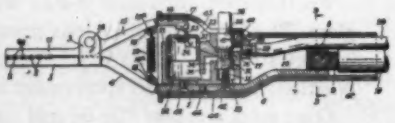


A method of testing metal for the presence of defects. First, a specimen of the metal is excited to longitudinal vibration and the frequency of this longitudinal vibration is adjusted to the specimen's natural frequency of resonance. The amplitude of this resonant frequency vibration is measured to indicate the resulting peak stresses which are set up in the specimen metal. Finally, this resonant frequency vibration's amplitude is amplified until the indicated peak stresses attain a predetermined high value at which a defective-metal specimen exhibits a damping capacity sharply differing from that of a sound-metal specimen. By measuring the damping capacity at the intensified amplitude of vibration, it is possible to determine whether the metal of the tested specimen is sound or defective.

* *

Electrode Holder

2,397,519, WILLIAM C. ANTHONY, Streator, Ill. Filed Feb. 26, 1944. Issued April 2, 1946.

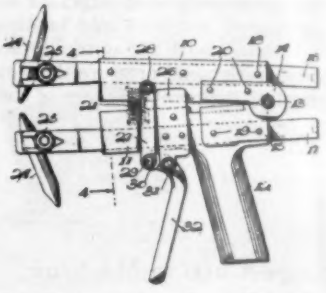


An electrode holder with a jaw upon which a second jaw is mounted. A means engaging each jaw, tends, when free to do so, to move the jaws in their opening direction. The jaws are kept in their closed position, however, by a power means comprising a cylinder-and-piston assembly. When pressure is supplied to the cylinder, the jaws are positively forced toward each other. Other elements are: a housing defining an inlet and an outlet passage, a valve in the housing to control the passage of fluid, a fluid pressure inlet conduit in communication with the housing, a bleeder discharge from the housing positions to discharge cooling fluid into the handle and a controlled member positioned in the bleeder discharge. An electrical conductor is mounted in the handle member and connected to one of the jaws.

Portable Welding Gun

2,402,004. ROBERT EARL ADAMS, Vancouver, Wash., assigned to GEORGE H. BUCKLER, Portland, Oreg. Filed Apr. 10, 1945. Issued June 11, 1946.

A spot-welding gun comprising a lower member having a depending pistol-type stock and an upper member hinged to the lower member. Electrodes mounted in both members are adapted to swing relatively to each other in the same plane. A trigger is pivoted between its ends to the lower members and has forward and rear arms on opposite sides of the pivot. The rear arm is juxtaposed to the stock so as to be gripped in the operator's hand. Link means connecting the forward arm of the trigger with the upper member between the welding tips and the point at which the members are hinged together. A spring acts in tension between the member mounted between the point and the tips.



* *

Welder's Headgear

2,402,431. JOSEPH L. MOROW, Wilkinsburg, Pa., assigned to DRAVO CORP., Pittsburgh. Filed June 9, 1944. Issued June 18, 1946.

Improvements for a welder's headgear comprising a safety helmet and a pivoted welding vizor. The improvements are in the means for pivotally uniting the vizor to the helmet and comprise a socket portion on a side of the helmet, a pin pivoted to a side of the vizor and including a portion detachably seating endwise in the socket, and means cooperating with the pin to provide frictional articulation of the vizor to the helmet.

* *

Acetylene Generating System

2,402,522. JAMES H. BUCKMAN, Cranford, N. J., assigned to UNION CARBIDE and CARBON CORP., New York City. Filed Dec. 28, 1939. Issued June 18, 1946.

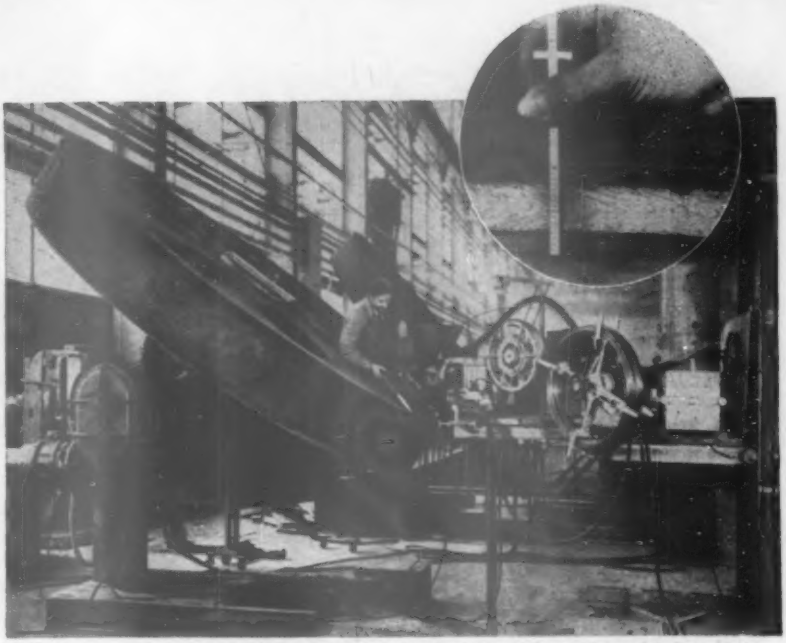
A plurality of acetylene generator units communicating with a single gas-delivery conduit and a control system for maintaining an adequate flow of gas. Control means is so constructed and arranged as to initiate and maintain operation of one of the units to discharge gas into the conduit. A device connected into the conduit is responsive to the rate of gas flow and operable at a predetermined increased rate of flow so as to render automatically an additional unit operative.

THE JOB: To weld the web plates to rim and hub on each side of a 12 foot turbine reduction gear . . . with speed, to meet the weld quality specified by the American Bureau of Shipping and the ASME.

THE PROBLEM: A peripheral weld must be made on very heavy plates in one pass with deep and complete penetration . . . with exact speed . . . exact heat control to minimize heat distortion and stress.

THE SOLUTION: C-F Power Operated Positioners with Variable Speed Table Rotation from 0 RPM and up were used to revolve the work under a Unionmelt Type UE-21 automatic welding machine.

THE RESULT: Fully automatic welding which produced a clean, high quality fillet 1⅛ in. across the face (see inset) and 36 ft. in length in one pass. No machining or spatter removal was necessary.



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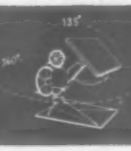

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THE ANNUAL AWS MEETING

The annual meeting of The American Welding Society with a detailed program of the papers to be presented.

THE METAL SHOW

Details regarding the exhibits of interest to those in the welding industry will be included in that section devoted to the annual Metal Show.

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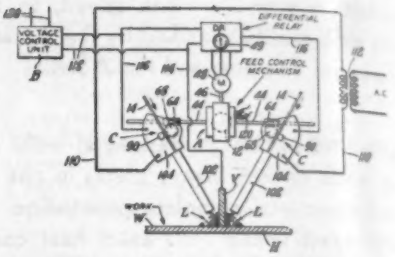

Automatic Welding Head

2,401,722. EDWIN A. CLAPP, Niagara Falls and LEONARD V. SPANGBERG, Youngstown, N. Y., assigned to THE LINDE AIR PRODUCTS CO., New York City. Filed Oct. 20, 1944. Issued June 11, 1946.

A pair of electrode feed devices and means for driving them by a common motor. A differential feed control mechanism connected between the devices permits changing the relative rates at which they are driven with respect to each other.

* *

Electrode Holder

2,400,903. EDWARD J. ALLEN, Cleveland, assigned to THE LEECE-NEVILLE Co., Cleveland. Filed Oct. 2, 1944. Issued May 28, 1946.

This electrode holder comprises a handle adapted to be grasped by one hand and an elongated hollow head mounted on one end of the handle so as to extend transversely of its axis. The head has a chamber for a cooling medium. A hollow rod support extends longitudinally of the head and through the chamber so as to be surrounded by the cooling medium. Other elements are a movable clamping means engageable with the rod and having an actuating member adjacent to the handle, and a spring for urging the clamping means into holding engagement with the rod. The actuating member is located relative to the handle so as to be in a position to be grasped by the same hand that manipulates the holder.

* *

Electric Soldering Iron

2,403,158. OSCAR WERTHEIM and LOUIS MOSES, Brooklyn. Filed Jan. 26, 1945. Issued July 2, 1946.

An electrically heated soldering iron comprising a barrel and a tube extending longitudinally of the barrel to contain solder. The tube has a threaded rear end and a threaded portion adjacent to its front end. The front end of the tube tapers forwardly of the threaded portion. A cap threaded on the rear end of the tube engages the rear end of the barrel, and a tip threaded on the tapered front end of the tube abutts the front end of the barrel. A sleeve of compressed heat-conducting material is enclosed in the tip and surrounds the tapered front end of the tube; an electric coil is carried by this sleeve. There are also insulation means between the sleeve and the tip, insulation means in the barrel, a valve in the front end of the tube, and operating means for the valve carried outwardly of the barrel.

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* Type TC—Tungsten-Copper
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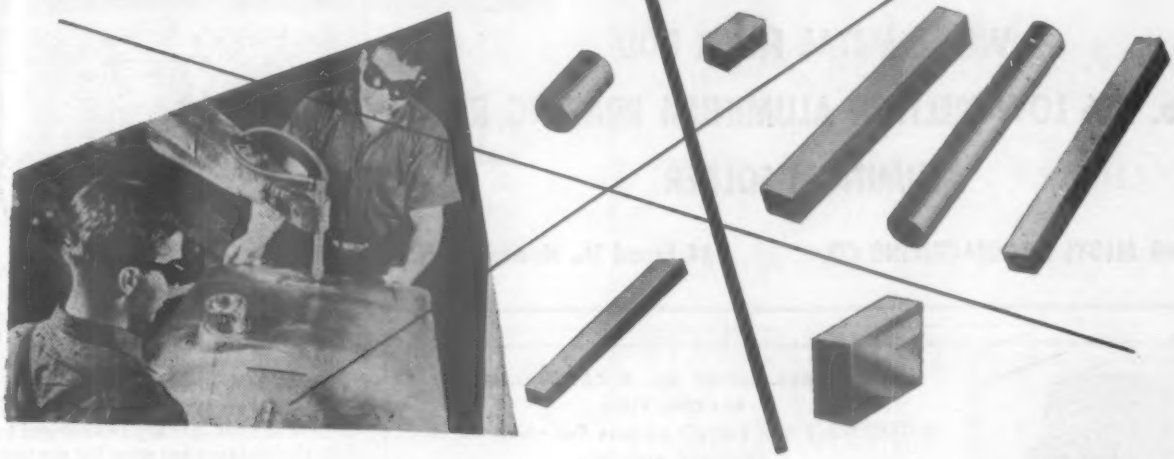

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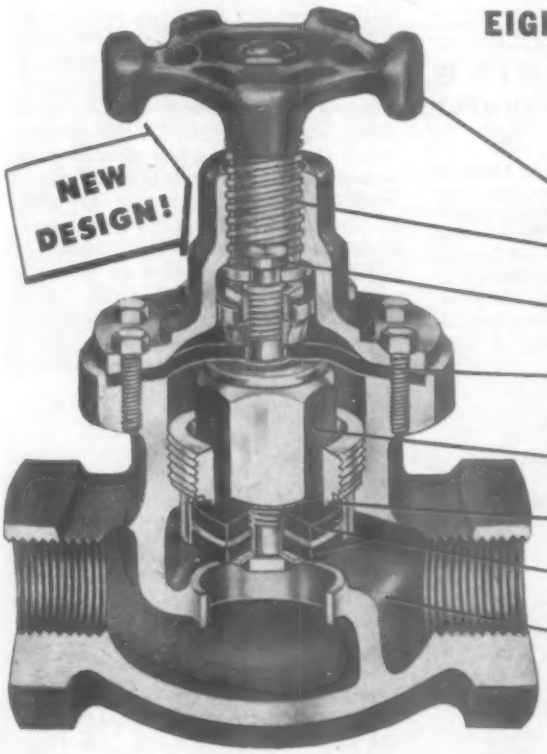

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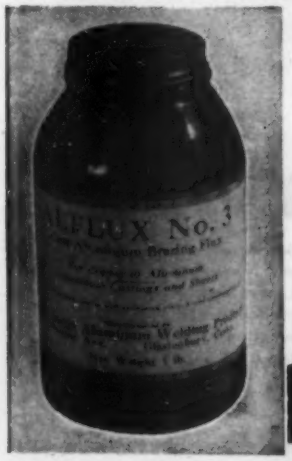

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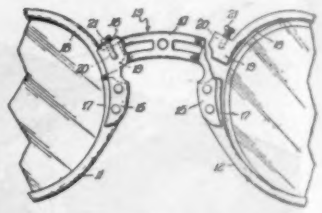
Eyeglasses

2,398,021. ROBERT L. MALCOM, Chicago, assigned to CHICAGO EYE SHIELD CO. Filed Dec. 22, 1943. Issued April 9, 1946.



An improved type of industrial eye shield having split lens-holding portions for ready removal of lenses. The improvement comprises a malleable nose bridge outwardly arched from the lens-holding portions and adapted for ready placement and adjustability in a template. The degree of arc can quickly be changed to regulate the distance between the centers of the lenses when pressure is brought to bear against them. The bridge has openings to permit bendability.

* *

Electrode Holder

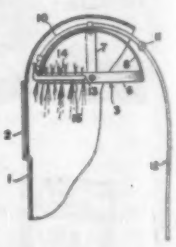
2,400,285. ROBERT H. BUCK, Oakland, Calif. Filed Oct. 4, 1943. Issued May 14, 1946.

An electrode holder having an insulated handle with a threaded contact rod projecting from it. A tubular metal member is threaded internally at one end to screw onto the rod. The opposite end is provided with movable jaws arranged to clamp a welding electrode. A clamping sleeve screws over the tubular member. When the sleeve is screwed up, it cooperates with the movable jaws to compress them upon the electrode; jaws are released by unscrewing the clamping sleeve. A threaded outer sleeve of insulating material screws over the clamping sleeve, outwardly embracing and covering its outer side and outer end. The insulating sleeve has a central hole through which the electrode projects when it is clamped in the jaws.

* *

Air-Supplied Mask

2,402,820. WILLIAM H. KITCHEN, Seattle. Filed Sept. 26, 1942. Issued June 25, 1946.



An open weldor's mask having attached air-supply means including a plenum tube extending across the inside face of the mask. In the tube are two series of openings, one directed upwardly and one downwardly. The individual openings of one series are staggered with respect to the individual openings of the other.

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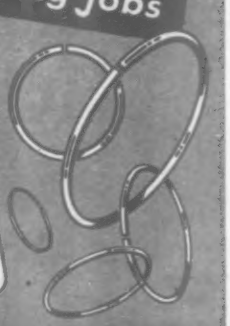

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Flame Hardening Guide

2,404,656. FREDERICK W. RIEDEL, Belle Vernon Pa. Filed Feb. 8, 1945. Issued July 23, 1946.

Torch-guiding means comprising a standard having a vertically adjustable bracket, a member adjustable horizontally with respect to the bracket, a supporting bar secured to the member, guide rods carrying fittings at their ends, means adjustably securing the fittings to the supporting bar, followers notched for guiding engagement with the guide rods, and means yieldingly urging the followers into guiding engagement with the rods.

* *

Face Shield

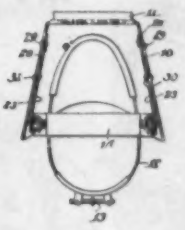
2,398,269. ROBERT A. YOUNG, Sioux City, Ia., assigned to SELLSTROM MFR. CO., Chicago. Filed Oct. 13, 1942. Issued April 9, 1946.

A shield, a goggle and a pair of levers are pivotally mounted on a support attached to the wearer's head. The levers operatively connected to the shield for raising and lowering the goggle when the shield is lowered and raised.

* *

Weldor's Helmet

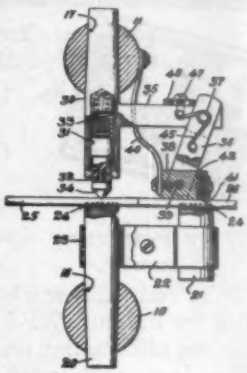
2,400,480. CHARLES E. BOWERS, Moylan, Pa., assigned to THE FIBRE-METAL PRODUCTS CO., Chester Pa. Filed March 13, 1944. Issued May 21, 1946.



A helmet having a window is mounted on a headgear for movement about a horizontal axis. Pivots attached to the helmet between the axis and the window adjustably support the mounting means so that the vertical relation of the window to the line of vision can be varied for different users.

Butt Welder

2,401,359. OSCAR G. LILJA, Rockford, Ill. Filed Sept. 27, 1943. Issued June 4, 1946.



An attachment for use with a butt welder having two horizontal electrode arms and mechanism for moving them toward each other. The device is fastened to the lower arm to provide seats for locating two work-pieces in abutting relation. Clamping members mounted on the other arm engage with the seated workpieces in the movement of the arms toward each other. A means actuated by the movement following engagement of the workpiece shifts one of the workpieces in the direction of the other.

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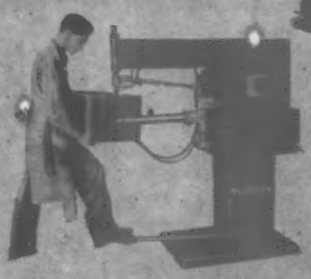

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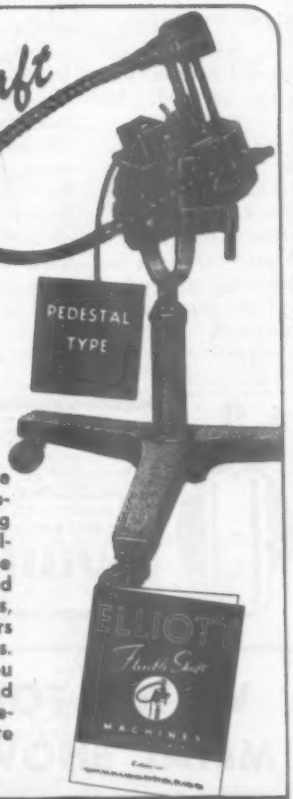

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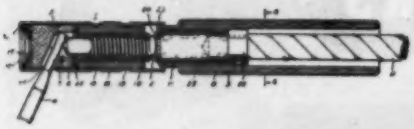
Electrode Holder

2,401,383. WAYNE E. WILSON, Schenectady, N. Y., assigned to GENERAL ELECTRIC Co., Schenectady, N. Y. Filed Mar. 30, 1945. Issued June 4, 1946.

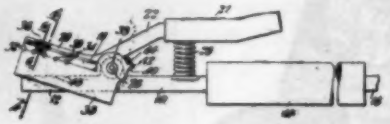


In an electrode holder including upper and lower jaws having electrode-gripping faces, an auxiliary jaw of insulating material. The auxiliary jaw has portions extending along the sides of the lower jaw and includes electrode-engaging upper edges; these portions project substantially below the lower jaw when in closed position. The auxiliary jaw is normally biased toward the upper jaw.

* *

Electrode Holder

2,402,535. EVERETT H. CUSHMAN, New York City, assigned to AIR REDUCTION Co., INC., New York City. Filed May 25, 1945. Issued June 15, 1946.



An electrode holder comprising a hollow cap and a jaw member supported to rotate with the cap and to move longitudinally. The jaw member has an electrode-holding slot extending from a longitudinal opening through its side wall in registry with an electrode opening in the cap. There are also a spring member between the cap and the outer end of the jaw, an internally threaded screw mounted for rotation with the cap and extending longitudinally from the longitudinal opening in the jaw, and a handle, on which a contact rod is mounted to resist rotation about the longitudinal axis. The contact rod has an electrode-engaging end projecting into the longitudinal opening in the jaw. An externally threaded portion engages the internally threaded screw mounted in the cap.

* *

Gas Manifold Control System

2,402,523. CHESTER A. SIVER, Indianapolis, assigned to UNION CARBIDE AND CARBON CORP., Filed Apr. 26 1940. Issued June 18, 1946.

In a control system for a plurality of acetylene generator units, control means so constructed and arranged as to initiate and maintain operation of one of the units, and means responsive to gas flow in the delivery conduit so constructed and arranged as to operate at predetermined successive changes in a condition of gas flow resulting from an increased demand for gas to render auxiliary units operative successively and in sequence, to operate concurrently with the prime unit. The device also renders inoperative and in reverse sequence the units at other predetermined successive changes in the condition resulting from a decreased demand for gas.

* *

Stud for Welding

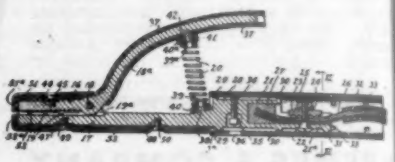
2,406,659. TED NELSON, San Leandro, Calif. Filed Feb. 20, 1943. Issued June 25, 1946.

An improvement in a welding stud having a recess in the end, a flux in the recess, and a cap over the recess to confine the flux. The improvement comprises a point centrally disposed on the cap to facilitate placement of the stud.

* *

Electrode Holder

2,401,523. RAYMOND L. TOWNSEND, Wichita, Kansas. Filed Sept. 19, 1944. Issued June 4, 1946.



In an electrode holder, the combination of a pair of combination jaw-and-handle elements, pivotally joined together at the dividing point between the handle and jaw portion of each element. Compression spring means interposed between the handle portion of the elements for resiliently holding the jaws in a closed position. There are also means electrically insulating the spring from the balance of the holder, means for mechanically and electrically connecting an electric feed cable to one of the handle elements and a slidably mounted tubular hand-hold element of insulation material. A screw means threaded through the handle element is engageable with the inner surface of the hand hold element to rigidly retain the hand hold element on its respective handle element. The inner surfaces of the electrical insulation members are curved and have tongue and boss formations that are receivable in grooves so that the insulation members may be lifted directly from the replaced on the handle and jaw elements.

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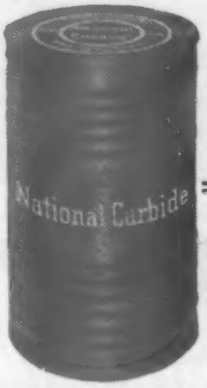

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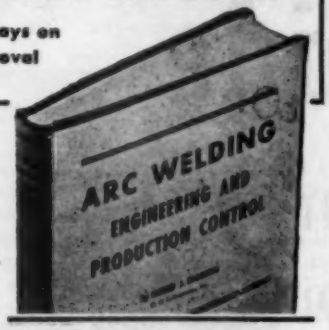

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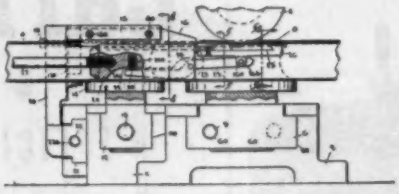
Seam Welder

2,400,889. Joseph U. Ridder, Lakewood, Ohio, assigned to The Yoder Co., Cleveland. Filed Mar. 3, 1943. Issued May 28, 1946.



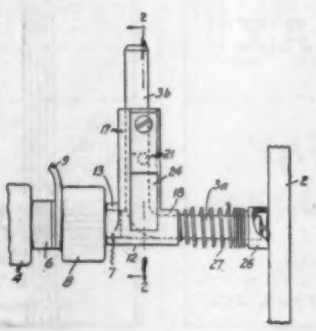
An apparatus for continuously feeding preformed tubing having seam edges adapted to be welded. It includes a pair of rotatable electrodes and rolls in alignment at opposite sides of the tubing, for compressing the walls thereof to move the seam edges into engagement. A holder is fixedly mounted in the tubing in advance of the electrodes with a rocker fulcrumed on its outer end portion. A pivotally mounted on the outer end of the rocker is a device consisting on an outer longitudinally extending guide arranged to engage the tubing walls in opposed relation to the electrodes, an inner guide portion spaced from and in advance of the electrodes engaging the tubing walls and serving to maintain the seam edges out of contact and an intermediate guide portion having a curvature longitudinally of the tubing substantially concentric to the peripheries of the electrodes. The marginal edge portions of the tubing are thus guided from the inner guide portion to the outer guide portion. A spring between the holder and the inner end of the rocker tend to rock it in one direction so that the guide portions are maintained under pressure against the inner walls of the tubing.

* *

Stud-Welding Chuck

2,402,256. Ted Nelson, San Leandro, Calif. Filed Jan. 10, 1944. Issued June 18, 1946.

A stud-welding machine chuck for holding a bent stud. It comprises a T-shaped socket having a groove aligned with the axis of the welding gun and a second groove meeting the first grove at an angle corresponding to the angle of the bent stud. There are also resilient means for retaining the stud in the chuck and a threaded flange on the latter for connecting it to the welding gun.



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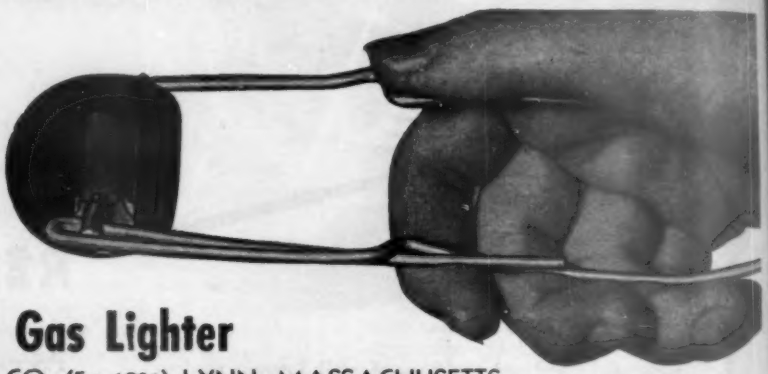

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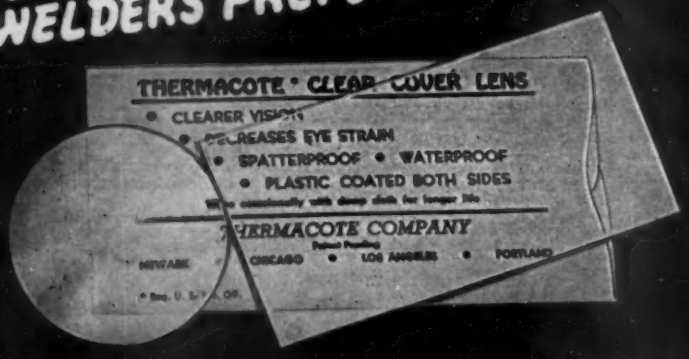
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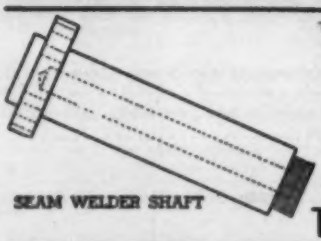

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